Rinnai®

E- Series Boiler

Troubleshooting Manual

⚠ WARNING

There are a number of live tests that are required when fault finding this product. Extreme care should be used at all times to avoid contact with energized components inside the product.

You MUST be a qualified service person before proceeding with these test instructions.

Before checking resistance readings, turn off power source to unit and then isolate each item to be checked from the circuit by unplugging it.

When setting gas pressures on one of these units, please check the complete model number you are trouble-shooting. Gas pressures and dip switches can vary among models. Always check the rating plate for complete information and follow directions.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

If any of the original wire as supplied with the appliance must be replaced, it must be replaced with type 18 AWG wire or its equivalent.

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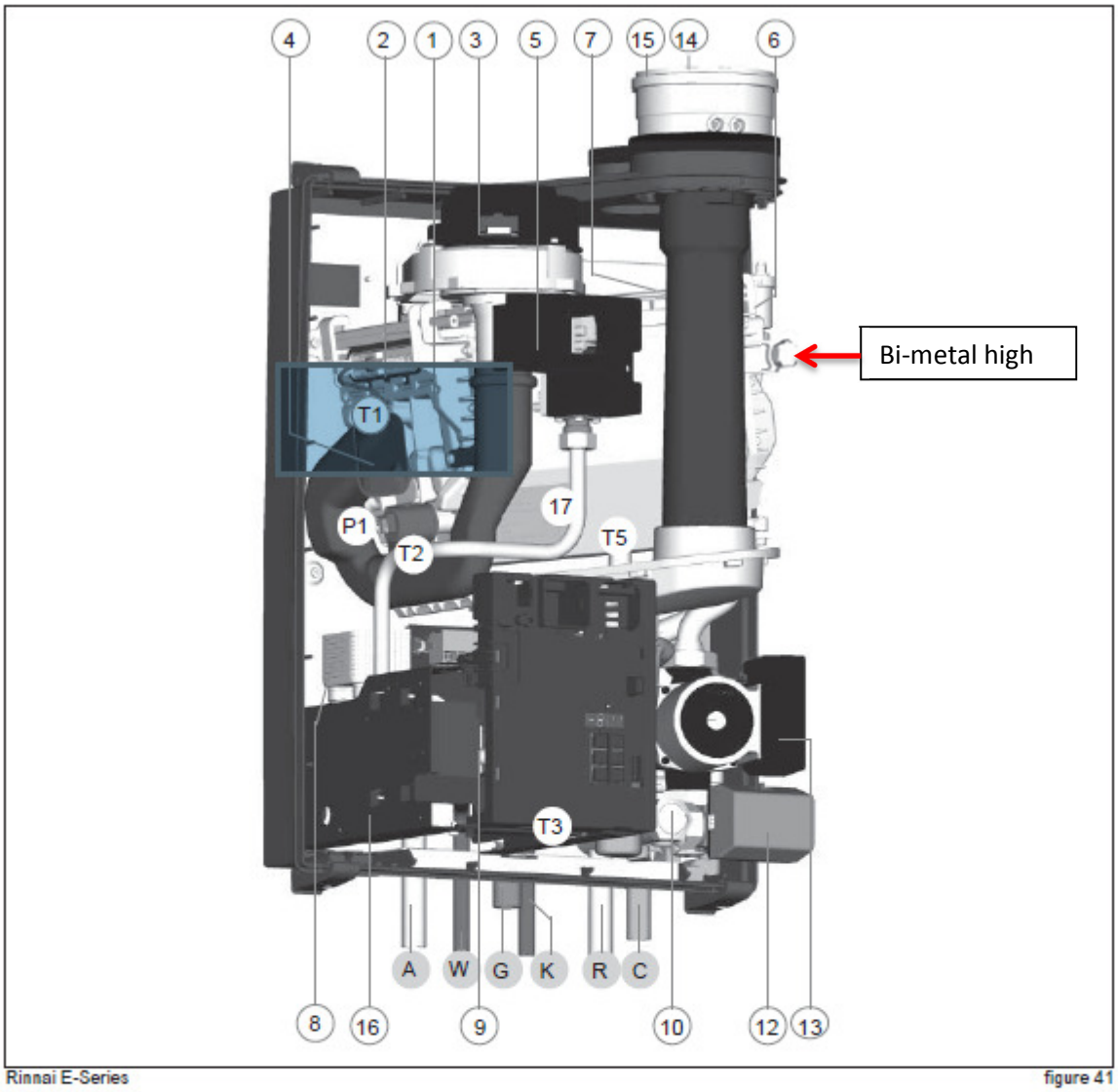
Rinnai is continually updating and improving products; therefore, specifications are subject to change without prior notice. Local, state, provincial and federal codes must be adhered to prior to and upon installation.

Parts of the Boiler



Rinnai E-Series

figure 41

1 heat exchanger	9 operating panel	17 ASME / NB / CRN data plate
2 ignition unit	10 Control Tower (CMS)	
3 fan unit	11 water filter return CH	
4 air inlet damper	12 three-way valve	
5 gas valve	13 circulation pump	
6 automatic de-aerator	14 exhaust	
7 ceramic burner cassette	15 combustion air supply	
8 plate heat exchanger DHW	16 CSA Data Plate (serial number)	

T1 supply sensor T2 return sensor T3 sensor DHW and flow switch	P1 water pressure sensor	G gas pipe A supply central heating R return central heating C condensate pipe K cold water pipe W hot water pipe

Block and Errors - Error indication (short reference)

A detected error is indicated on the display by means of a blocking or error messages. A distinction should be made between these two messages due to the fact that a blocking code can be of a temporary nature, however, error messages are fixed "lockouts" or hard lockouts. The control will try its utmost to prevent a lockout and will temporary switch off the unit by blocking it, below is a list of some messages the unit will display.

Blocks: bL with a number in the last two positions indicates the type of blocking code.

bL 01 Block 01: External safety contact cut off.
bL 05 Block 05: Outdoor reset sensor not connected.
bL 60 Block 60: Incorrect parameter setting of the minimum or maximum power (Btu) of boiler.
bL 67 Block 67: A ΔT has been detected between flow and the return sensor whereas the burner is not in operation. After the ΔT has disappeared the block will clear itself.
bL 85 Block 85: The control has not detected water flow. The venting cycle (pro-purge) cycle has started. If during this cycle water flow is detected, the pro-purge cycle stops, the burner will then fire up.

Error: E with a number in the last two positions indicates the type of error code.

E 00 Error 00: Poor flame forming.
E 02 Error 02: No flame forming.
E 04 Error 04: Adjustment or error due to voltage interruption.
E 05 Error 05: Adjustment.
E 12 Error 12: High limit stat.
E 18 Error 18: Maximum flow temperature exceeded.
E 19 Error 19: Maximum return water temperature exceeded.
E 28 Error 28: Fan revolutions not being measured by control board. Flame present when burner is off, electrical interference, poor ground, and flame sensing wire disconnected during off cycle.

E 69 Error 69: No or incorrect display.
FUSE FUSE: 24 V fuse defective or blown.

mode press and hold the **"STEP"** button for 5 seconds.

Operation Indication
0 - No heat demand
1 - Fan pre/post purge
2 - Ignition phase
3 - Burner active on central heating
4 - Burner active on DHW
5 - Fan check
6 - Burner off when either DHW or room thermostat is calling * (See note 2 below).
7- Pump overrun phase for central heating
8- Pump overrun phase for hot water
9 - Burner off because of too high flow temperature
A - Automatic de-aeration program
F – Fan test still activated in Service mode
H Burner test still activated in Service mode

*Note 2; (E Boiler) a continuous code 6 can mean there is a small hot water leak triggering the plate heat exchanger sensor to call continually for DHW in turn locking out space heating in DHW priority. Switch PARA 36 to 20 (flow switch only) and then repair leak.

NOTE; if the unit appears to be fine but doesn't run and no error code is displayed check;

a. That the desired programming is on; set to either Central Heating and/or Domestic Hot Water.
b. The unit is not in the Showroom Mode

Explanation of T Sensors:

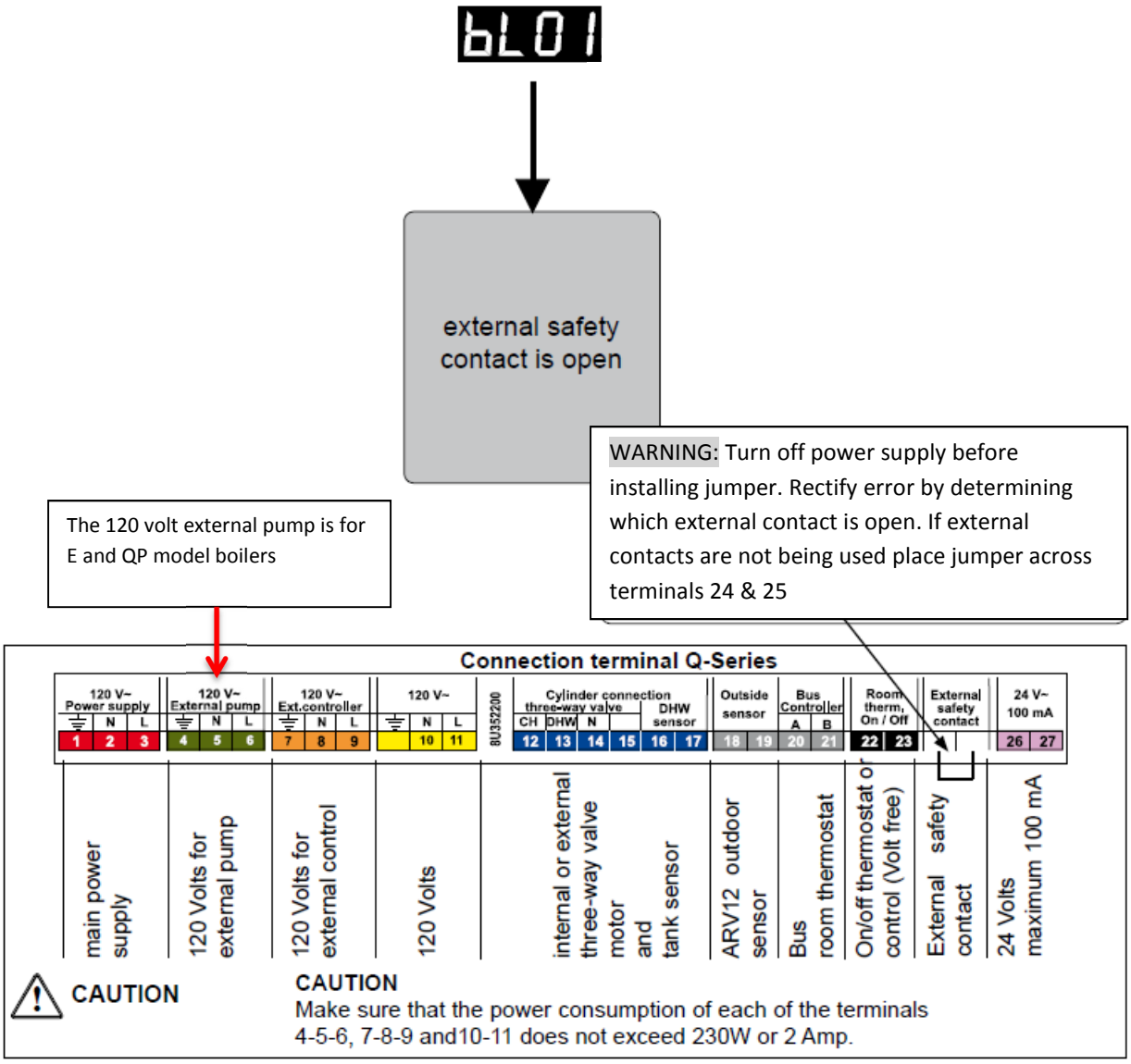
T1- Supply sensor - Water leaving heat exchanger mounts in flow of water.

T2 - Return water sensor, surface mounted.

T3 - Domestic hot water flow sensor,. Q175C uses a surface mount sensor. Q models with optional 3-way valve use a sensor designed to be used in a well. (QP uses a well)

T4 – Outdoor reset sensor, mounted outside building.

T5 - Flue gas sensor - Optional sensor not included with boiler.


bL01
external safety contact is open
WARNING: Turn off power supply before installing jumper. Rectify error by determining which external contact is open. If external contacts are not being used place jumper across terminals 24 & 25
The 120 volt external pump is for E and QP model boilers
Connection terminal Q-Series
120 V~ Power supply
120 V~ External pump
120 V~ Ext.controller
120 V~
8U352200
Cylinder connection three-way valve
DHW sensor
Outside sensor
Bus Controller
Room therm, On / Off
External safety contact
24 V~ 100 mA
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 26 27
main power supply
120 Volts for external pump
120 Volts for external control
120 Volts
internal or external three-way valve motor and tank sensor
ARV12 outdoor sensor
Bus room thermostat
On/off thermostat or control (Volt free)
External safety contact
24 Volts maximum 100 mA
CAUTION
CAUTION
Make sure that the power consumption of each of the terminals 4-5-6, 7-8-9 and10-11 does not exceed 230W or 2 Amp.

If multiple boiler safeties are to be wired in series check with your local inspector or the local or State codes to see if this is allowed in your area before proceeding. NEVER wire boiler safeties in parallel.

Refer to wiring diagram in the boiler manual. Trace connections 24 and 25 above back to the MCBA. These will be located on Plug X5 on the MCBA on pins 2 and 6.

Rinnai

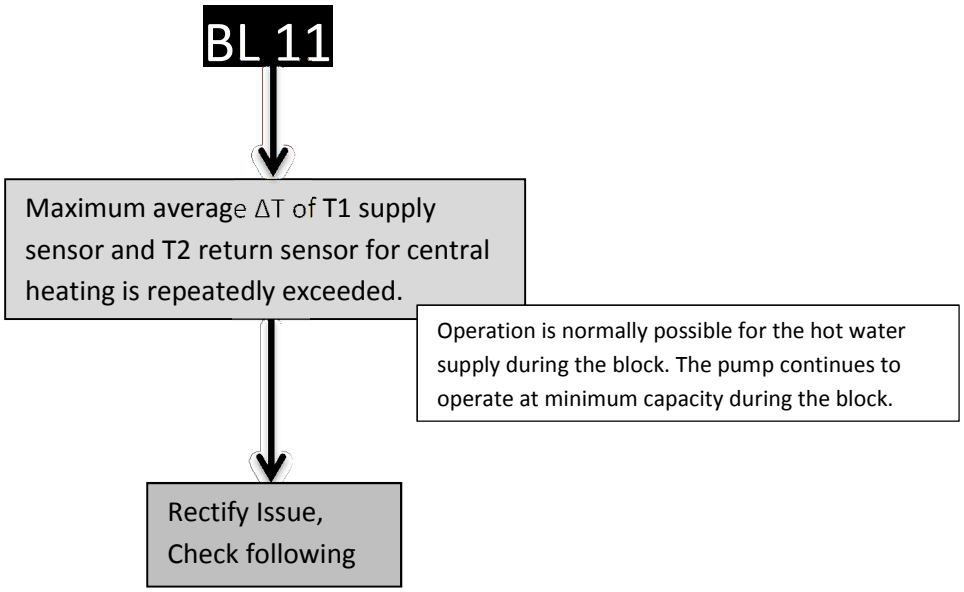
TECHNICAL BULLETIN 95

Boiler Blocking Code bl05

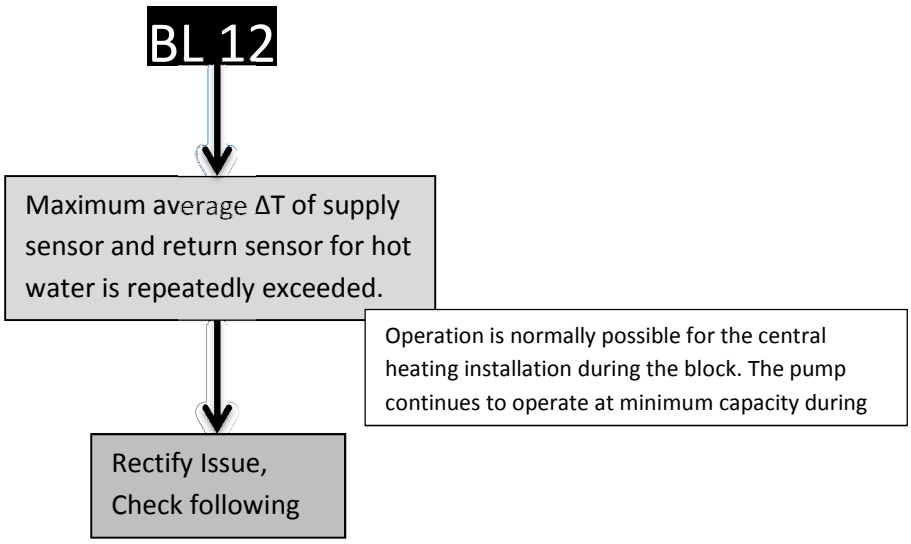
A new blocking code is now present in all boilers and MCBA's manufactured after September 1, 2012. The new code is a bl05, blocking 05: Outdoor sensor contact open (outdoor sensor not connected). This code will not prevent the boiler from operating; it will however be displayed until an outdoor sensor has been reconnected to the boiler or a resistor has been placed in the outdoor sensor terminals.

An outdoor sensor is not required for the boiler to operate. If no outdoor sensor is present the boiler will operate as it has in the past as a limit boiler, with the only difference being a bl05 code will always be displayed. A jumper wire should not be installed because this will cause the boiler to see an outdoor temperature of 230°F and force the boiler into summer setback. If nothing is connected to the outdoor sensor terminals then the temperature will be seen as -22° F. If no outdoor sensor is connected to the boiler the boiler will still go through the de-aeration cycle as long as either the heat or hot water program has been activated.

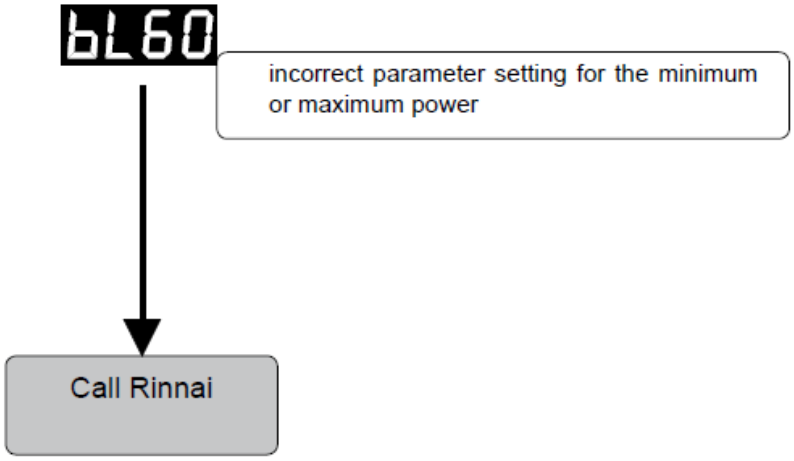
A resistor value can be selected from the tables in Appendix A and B in the back of the manual. When the bl05 code is present the water temperature cannot be viewed by pressing the step button on the boiler pressure, nor can the technical readout status be viewed (0 to 9 or A). When performing maintenance, trouble shooting, or starting up and commissioning the boiler, to view the technical readout and water temperature a 100k ohm resistor should be placed in the outdoor sensor terminals. When a 100k ohm resistor is installed on the outdoor sensor terminals Info 7 which is the outdoor temperature will read -6°F.


BL 11
Maximum average ΔT of T1 supply sensor and T2 return sensor for central heating is repeatedly exceeded.
Operation is normally possible for the hot water supply during the block. The pump continues to operate at minimum capacity during the block.
Rectify Issue, Check following

1. Check flow through the heating system.
2. Possible causes: radiator shut off valves closed, blocked water filter.
3. Verify proper installation of the boiler plumbing, connections and all components.
4. Check minimum and maximum temperature difference in Parameter step 46 and 47.
5. Activated room sensor (RS100) in non leading room (closed thermostatic radiator valves?) Check pump height. Should this be check pump head? **Do not understand**


BL 12
Maximum average ΔT of supply sensor and return sensor for hot water is repeatedly exceeded.
Operation is normally possible for the central heating installation during the block. The pump continues to operate at minimum capacity during
Rectify Issue, Check following

1. Check flow through the boiler and DHW tank.
2. Possible causes: radiator shut off valves closed, blocked water filter, restriction in DHW tank to high.
3. Verify proper installation of the boiler plumbing, connections and all components.
4. Ensure 3 way valve is functioning properly and is not clogged or full of pollution.



NOTE; in order to reset all parameters in your boiler back to factory defaults follow the “Activating Factory Settings” (Green button function) instructions found in your owner’s manual. **CAUTION: All parameters you adjusted will now have to be reprogrammed** if the bL60 code clears up. If after resetting the boiler the bL60 still appears, you will need to replace the sub-PC board and reprogram the MCBA. The sub PC board must be from a conversation kit for the same gas type as your boiler.

WARNING: Before replacing the sub PC board or installing a conversion kit turn off the gas and electrical supply to the boiler.

If conversion parts are not locally accessible contact Rinnai Tech Support for assistance. These parameters cannot be accessed in the field and may require special instructions in an emergency situation.

bL67

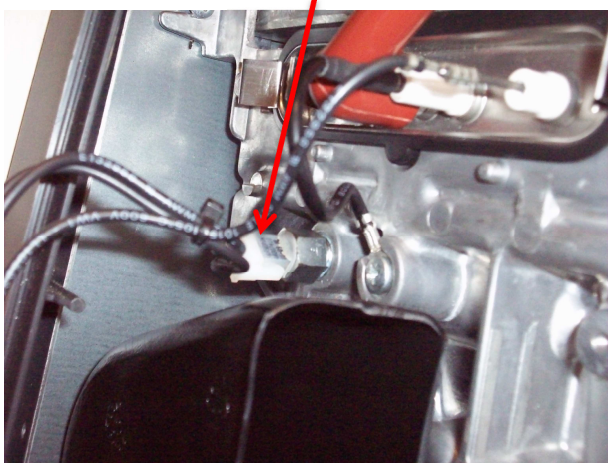
A temperature difference has been detected between the supply T1 sensor and the return T2 sensor while the burner is not in operation. After the average ΔT has disappeared, the blocking code will go away.

check the sensors NTC 1 and NTC 2

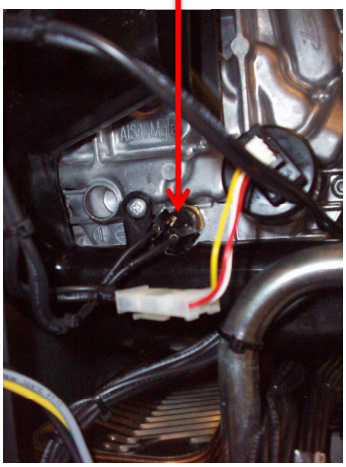
Check the supply T1 sensor and the return T2 sensor for the proper resistance valve. Replace if found to be defective. **WARNING:** Turn off power and water supply to boiler before removing the T1 or T2 sensor.

check the installation for any external heat source and rectify this

T1 Sensor



T2 Sensor



bL80

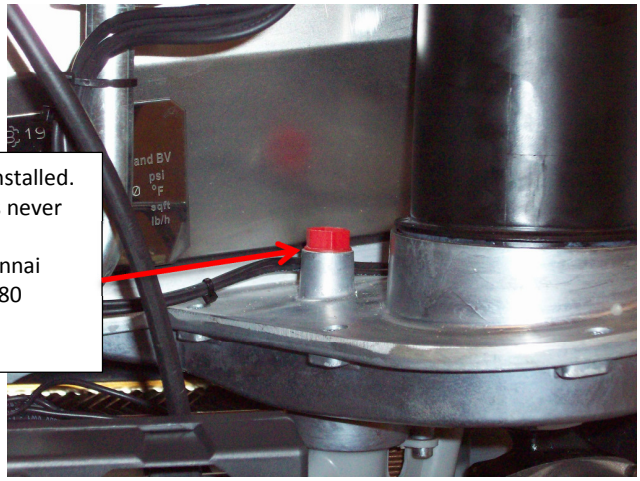
flue sensor temperature too high

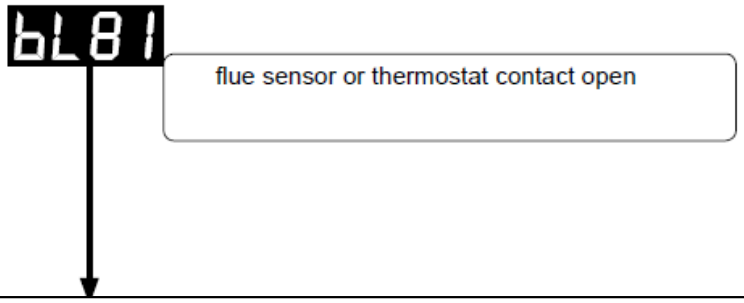
Inspect vent system and all air passages ways for blockage

212˚F is the default temperature setting for parameter 84. Verify to see if the temperature setting for this parameter is set higher than the default. If so, inspect vent system for blockage. **CAUTION:** ensure all vent components are properly seated when re-installed.

T5 sensor is registering too high of a temperature. This error can only occur if the optional T5 sensor is was purchased and installed on the boiler.

This is the location of the T5 sensor if installed. If the red tab is in place this sensor was never installed, which means the circuit has somehow been jumped out. Contact Rinnai tech support for assist if you get the bL80 without the T5 sensor being installed.





Explanation: The bL81 can be triggered if the flue gas plug has gotten wet and then dried out. (MCBA sees resistance when wet and then sees no resistance when dry) This tricks the MCBA into thinking that a flue gas sensor was installed and then removed in which the bL 81 is triggered. Moisture can come from a clog, broken or dry condensate trap. Moisture can be from a leaking concentric vent pipe or from driving rain during extreme weather.

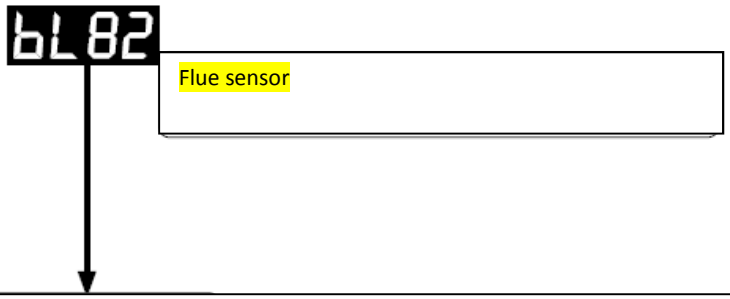
WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

Methods to rectify:

A. ORDER AND INSTALL A FLUE GAS SENSOR (This may not be possible in cold weather when boiler must operate immediately, if shipping the part is required.

B. CHANGE PARA 80 TO 20 AND INSTALL LOW VOLTAGE JUMPER ON FLUE GAS PLUG - (plug located on upper left hand side of the heat exchanger in the harness) (PARA 20 setting causes the MCBA to look for an open/ close circuit and ignores any variable resistance values like moisture or a thermistor.

C. INSTALL A 10K OHM RESISTOR ACROSS FLUE GAS TERMINALS. This will make the MCBA think that the flue gas is at a safe temperature level (90 F)



Explanation: The bL81 can be triggered if the flue gas plug has gotten wet and then dried out. (MCBA sees resistance when wet and then sees no resistance when dry) This tricks the MCBA into thinking that a flue gas sensor was installed and then removed in which the bL 81 is triggered. Moisture can come from a clog, broken or dry condensate trap. Moisture can be from a leaking concentric vent pipe or from driving rain during extreme weather.

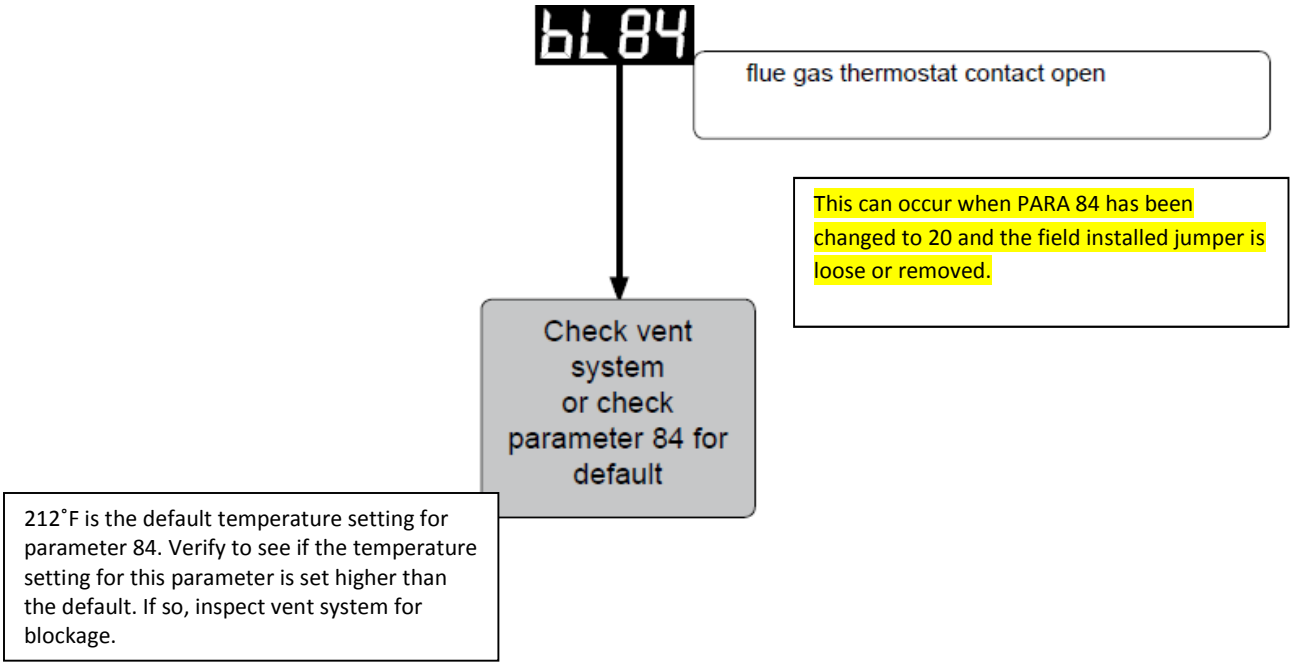
WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

Methods to rectify:

D. ORDER AND INSTALL A FLUE GAS SENSOR (This may not be possible in cold weather when boiler must operate immediately, if shipping the part is required.

E. CHANGE PARA 80 TO 20 AND INSTALL LOW VOLTAGE JUMPER ON FLUE GAS PLUG - (plug located on upper left hand side of the heat exchanger in the harness) (PARA 20 setting causes the MCBA to look for an open/ close circuit and ignores any variable resistance values like moisture or a thermistor.

F. INSTALL A 10K OHM RESISTOR ACROSS FLUE GAS TERMINALS. This will make the MCBA think that the flue gas is at a safe temperature level (90 F)


bL84
flue gas thermostat contact open
This can occur when PARA 84 has been changed to 20 and the field installed jumper is loose or removed.
Check vent system or check parameter 84 for default
212˚F is the default temperature setting for parameter 84. Verify to see if the temperature setting for this parameter is set higher than the default. If so, inspect vent system for blockage.

no water flow can be detected through the controller. De-aeration cycle is started. When water flow is detected during this cycle, the de-aeration cycle is terminated and the burner is released.
The controller checks the water pressure during static and dynamic situation.

check the boiler pump

Check the installation for the presence of air.
If there is a secondary pump installed and it is not hydraulically separated, it could cause a loss of pressure difference.

Check to ensure the pump is functioning and/or water pressure sensor is working properly.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

Ensure water pressure sensor is not clogged or defective.
Inspect water filter for debris.
Check pump for proper operation and flow rates.
Check for proper wiring of pump.
Check for use of balancing valves.

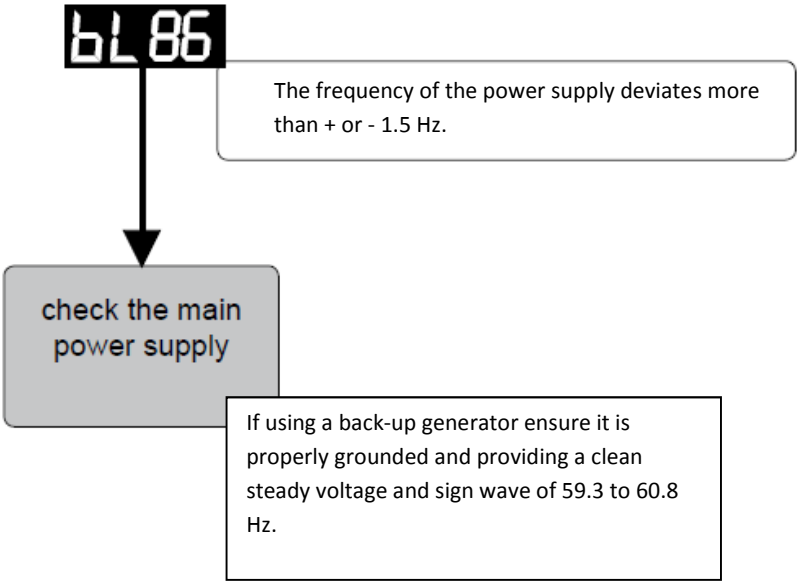
AIR: if boiler, inner boiler piping, or Low Loss Header has a large air bubble in it the pressure sensor will not see the pressure spike that the pump generates when it starts. The pressure spike is what tells the MCBA that the pump has started.
The air bubble will absorb that spike. Bleed all air from the system.

If an additional expansion tank is placed in the system alongside an E-boiler that tank can absorb the pump pressure spike as well. You may need to isolate that tank to see if this corrects the issue with BL 85.

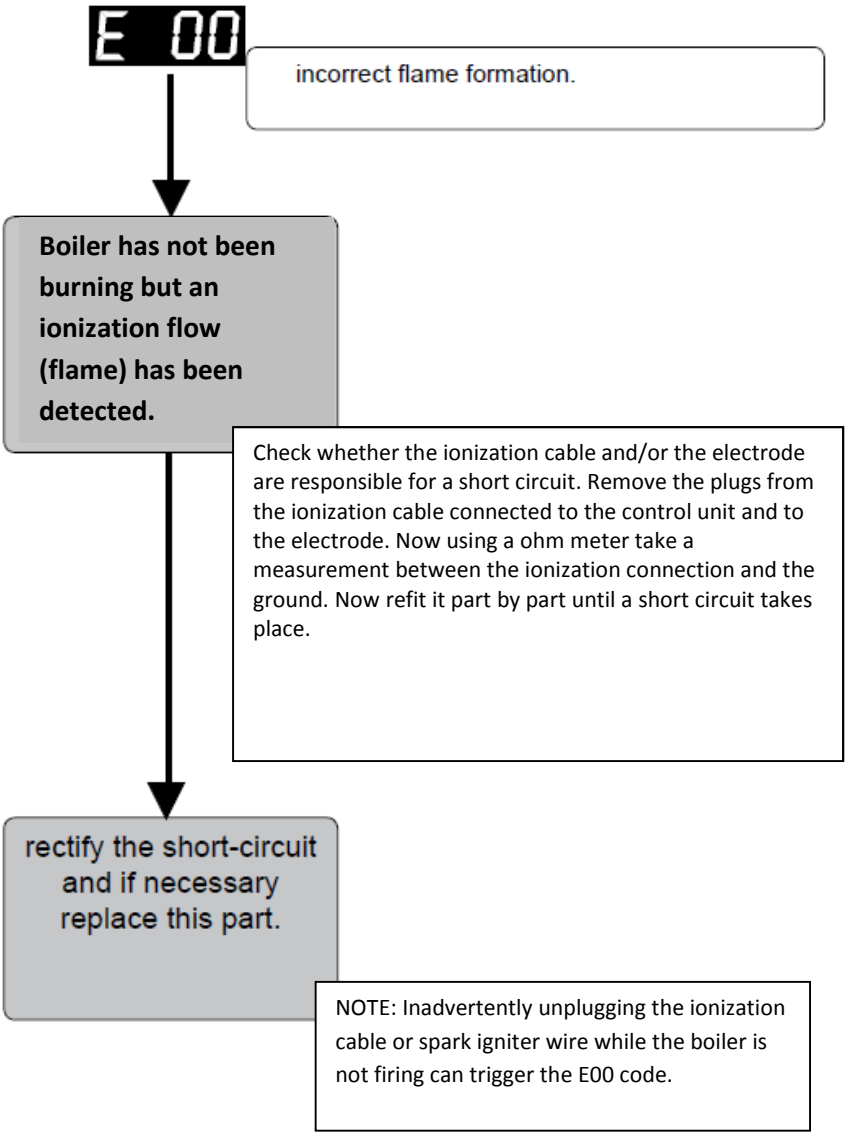
An expansion that is not charged properly can cause the pump's pressure spike not to be seen by the sensor causing a BL85.

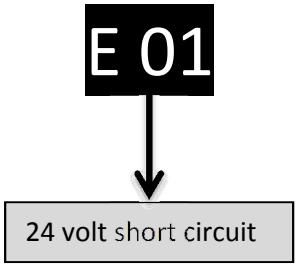
Expansion tank pressure should be air charged to match whatever water fill pressure that is chosen for the closed loop. (Always above 14.5 psi)

Expansion tanks must be air charged only when there is no water pressure on the wet side of the diaphragm or the tank is removed from the system. Once charged to the correct air pressure it may be placed into the system and the water fill pressure now may be set to match the new tank pressure.


bL 86
The frequency of the power supply deviates more than + or - 1.5 Hz.
check the main power supply
If using a back-up generator ensure it is properly grounded and providing a clean steady voltage and sign wave of 59.3 to 60.8 Hz.

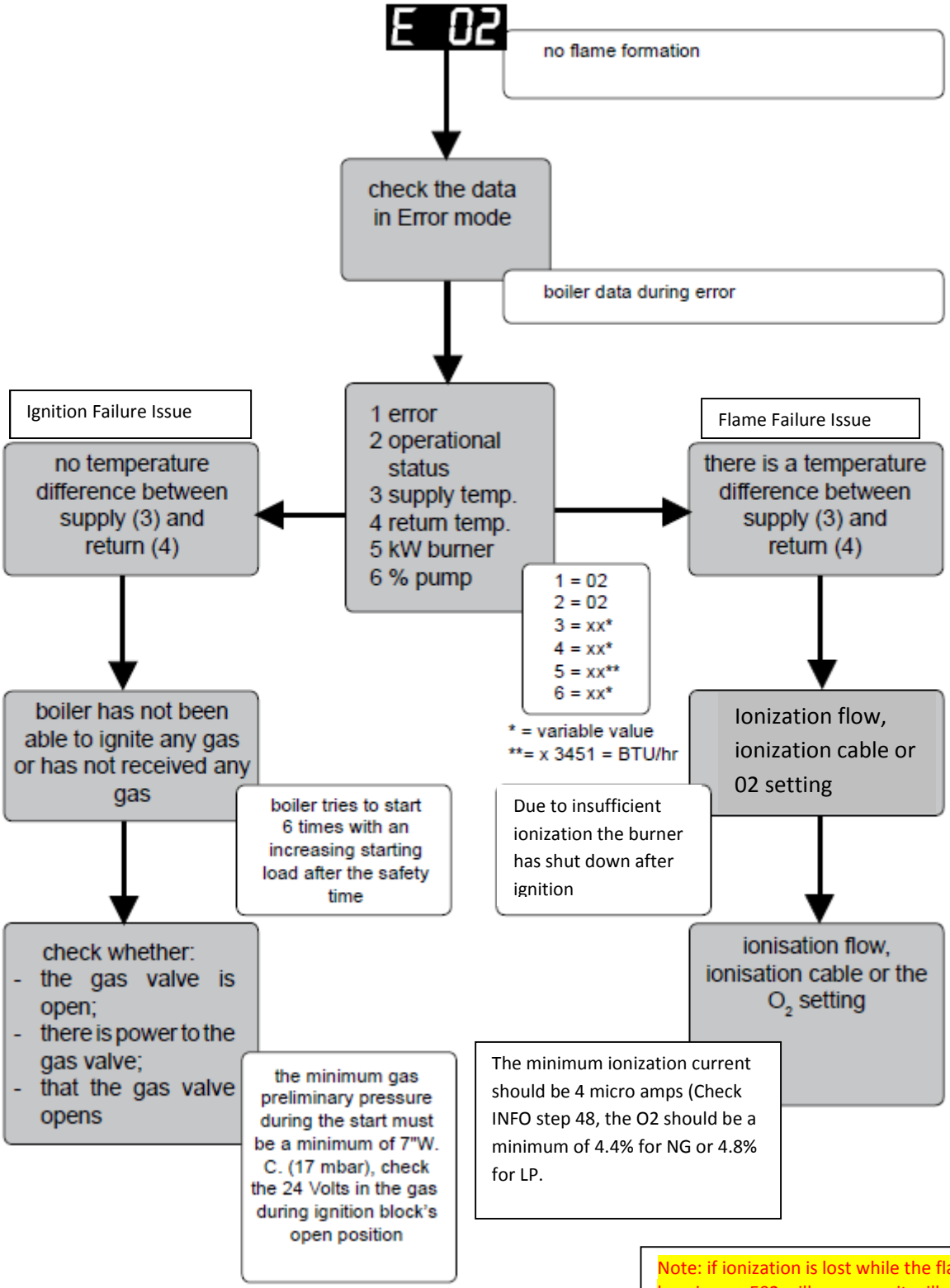
WARNING: Turn off power and water supply to the boiler before removing or installing any parts.


E 00
incorrect flame formation.
Boiler has not been burning but an ionization flow (flame) has been detected.
Check whether the ionization cable and/or the electrode are responsible for a short circuit. Remove the plugs from the ionization cable connected to the control unit and to the electrode. Now using a ohm meter take a measurement between the ionization connection and the ground. Now refit it part by part until a short circuit takes place.
rectify the short-circuit and if necessary replace this part.
NOTE: Inadvertently unplugging the ionization cable or spark igniter wire while the boiler is not firing can trigger the E00 code.



Remove all 24 volt connectors, such as: fan, pump, any three port valve and the 24 volt plug to the connecting block. Check for a short circuit in the disconnected components. Next; switch on power to the control board with all the 24 volt components disconnected. Reconnect the components one at a time, if code E 01 appears when you plug up a component, that component has a short circuit. Rectify any short circuits or replace defective component causing short circuit.

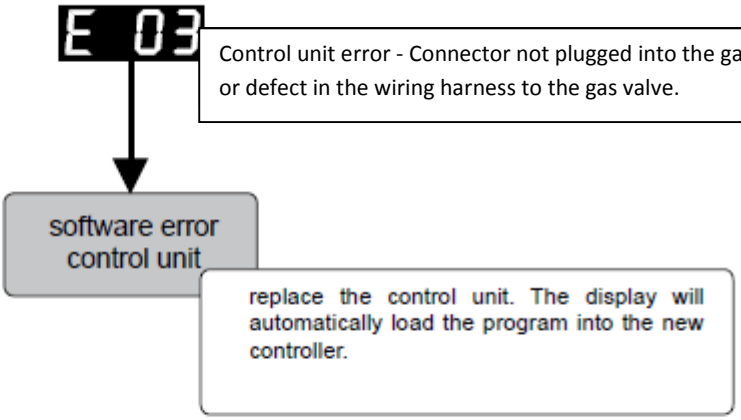
WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 02
no flame formation
check the data in Error mode
boiler data during error
1 error
2 operational status
3 supply temp.
4 return temp.
5 kW burner
6 % pump
Ignition Failure Issue
no temperature difference between supply (3) and return (4)
Flame Failure Issue
there is a temperature difference between supply (3) and return (4)
1 = 02
2 = 02
3 = xx*
4 = xx*
5 = xx**
6 = xx*
* = variable value
**= x 3451 = BTU/hr
boiler has not been able to ignite any gas or has not received any gas
boiler tries to start 6 times with an increasing starting load after the safety time
Due to insufficient ionization the burner has shut down after ignition
Ionization flow, ionization cable or 02 setting
check whether:
- the gas valve is open;
- there is power to the gas valve;
- that the gas valve opens
the minimum gas preliminary pressure during the start must be a minimum of 7"W. C. (17 mbar), check the 24 Volts in the gas during ignition block's open position
ionisation flow, ionisation cable or the O_2 setting
The minimum ionization current should be 4 micro amps (Check INFO step 48, the O2 should be a minimum of 4.4% for NG or 4.8% for LP.

Note: if ionization is lost while the flame is burning no E02 will occur - unit will attempt to relight 6 times. E02 only occurs after 6 failed attempts for re-ignition.

Propane gas with low BTU value or a brand new tank that may contain something other than pure propane may cause E02. Check against a good known source of gas.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.

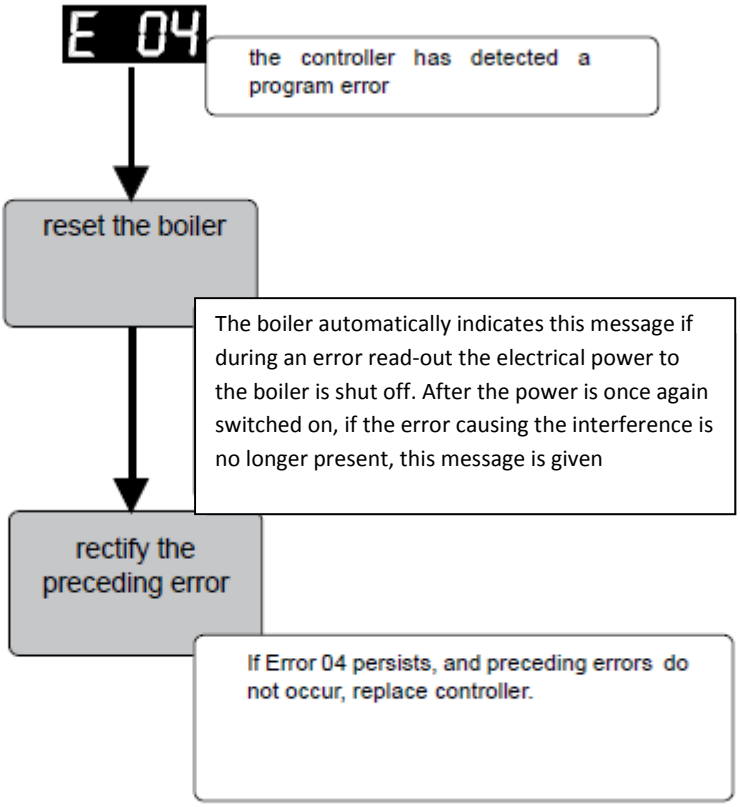

E 03
Control unit error - Connector not plugged into the gas valve or defect in the wiring harness to the gas valve.
software error control unit
replace the control unit. The display will automatically load the program into the new controller.

Check for 24 volts DC at gas valve.

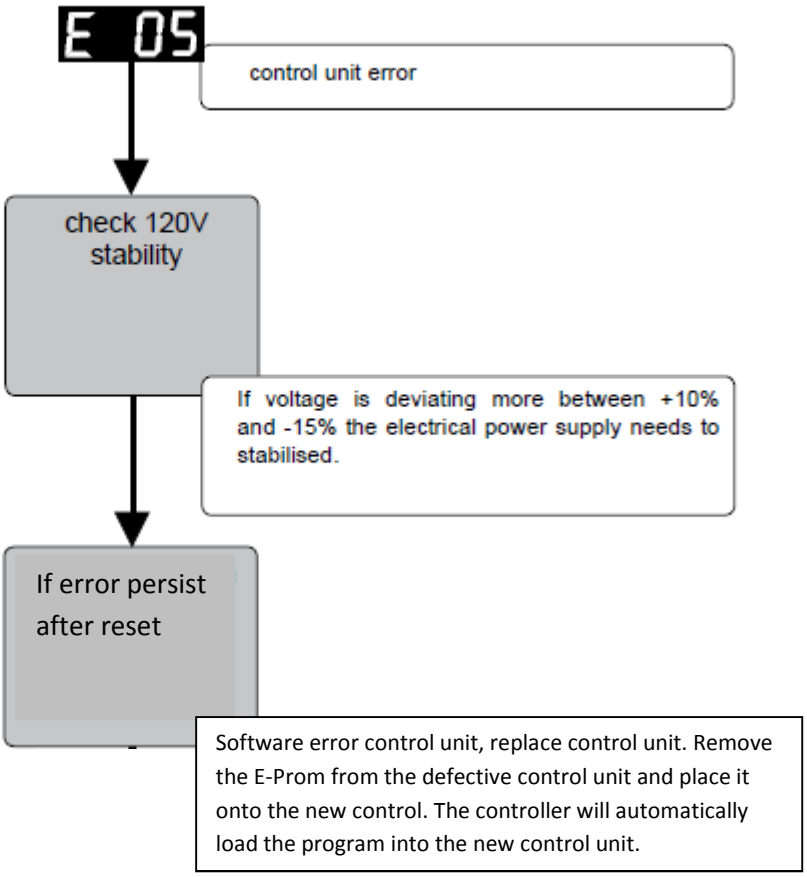
Check across terminals 4 and 5 at plug X5 on the main control board. See wiring diagram for your boiler for terminal locations

In some cases an E03 is caused from a loose connection on wires to the gas valve. This faulty connection may be in the Molex plug (X5) on the MCBA. Examine plug closely for bayonets that may have backed out of plastic casing.

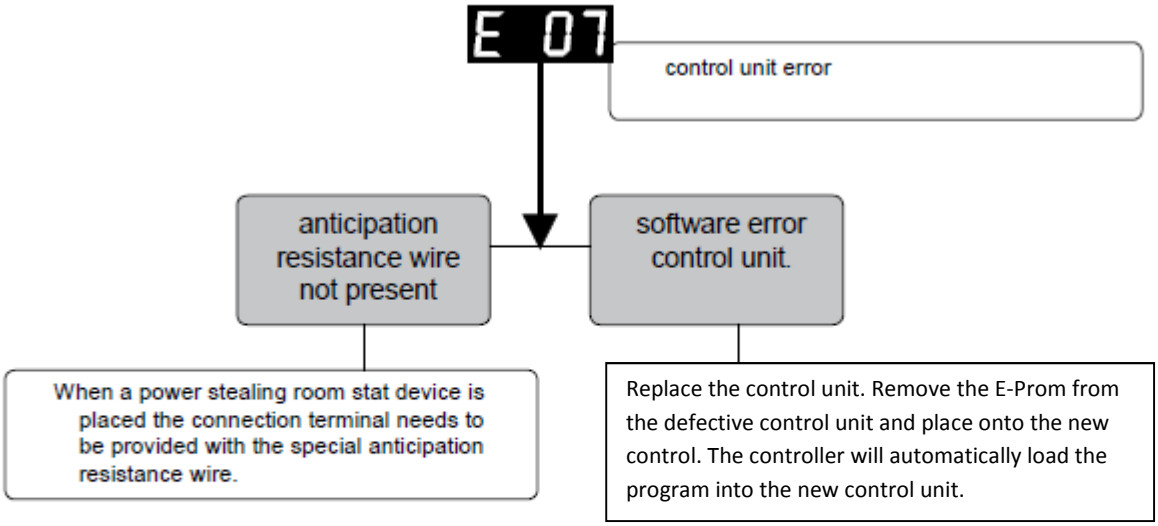
WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 04
the controller has detected a program error
reset the boiler
The boiler automatically indicates this message if during an error read-out the electrical power to the boiler is shut off. After the power is once again switched on, if the error causing the interference is no longer present, this message is given
rectify the preceding error
If Error 04 persists, and preceding errors do not occur, replace controller.

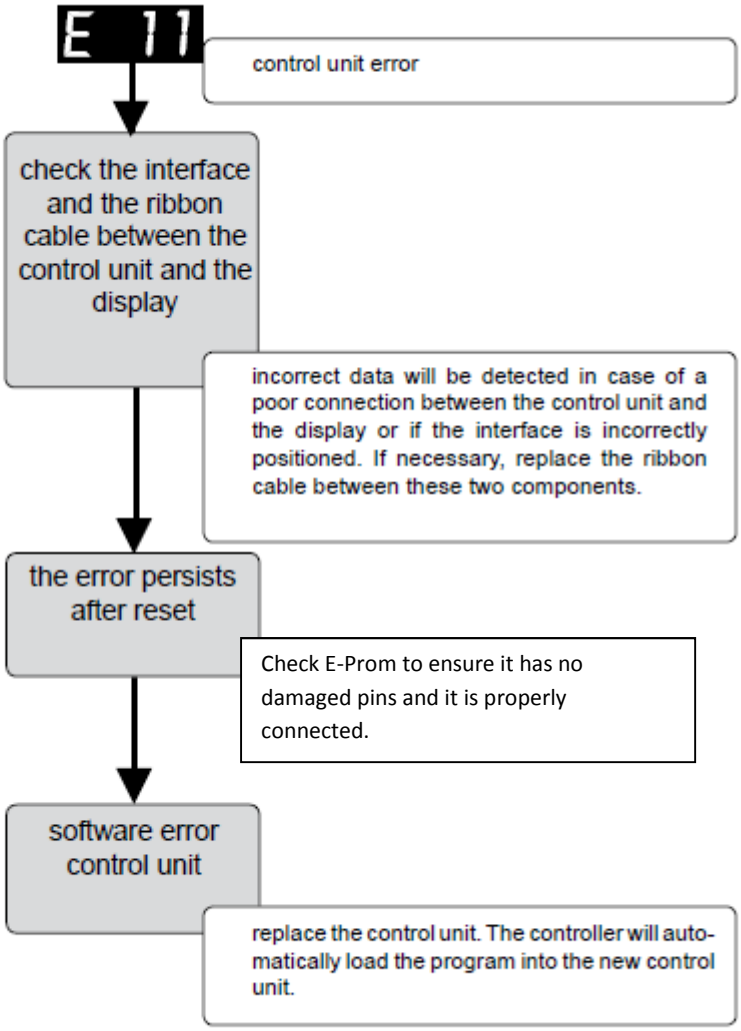
WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 05
control unit error
check 120V stability
If voltage is deviating more between +10% and -15% the electrical power supply needs to stabilised.
If error persist after reset
Software error control unit, replace control unit. Remove the E-Prom from the defective control unit and place it onto the new control. The controller will automatically load the program into the new control unit.

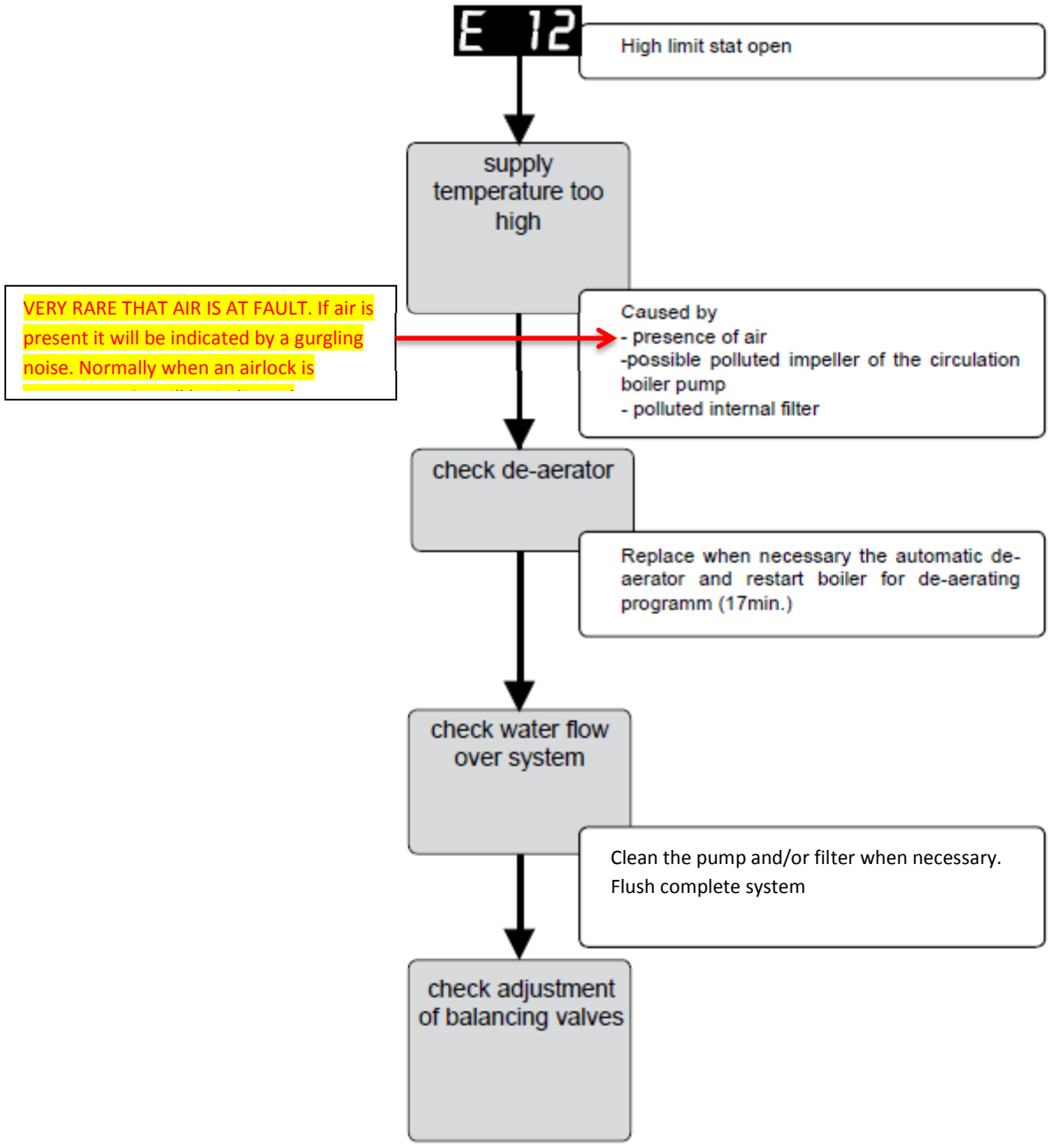
WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 07
control unit error
anticipation resistance wire not present
software error control unit.
When a power stealing room stat device is placed the connection terminal needs to be provided with the special anticipation resistance wire.
Replace the control unit. Remove the E-Prom from the defective control unit and place onto the new control. The controller will automatically load the program into the new control unit.

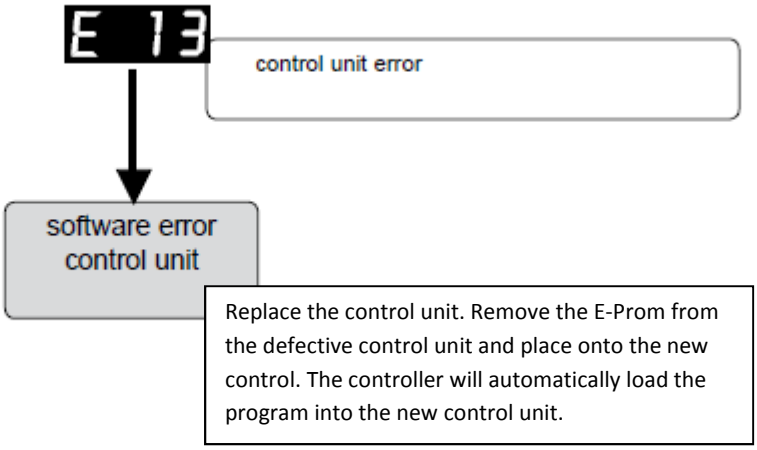
WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 11
control unit error
check the interface and the ribbon cable between the control unit and the display
incorrect data will be detected in case of a poor connection between the control unit and the display or if the interface is incorrectly positioned. If necessary, replace the ribbon cable between these two components.
the error persists after reset
Check E-Prom to ensure it has no damaged pins and it is properly connected.
software error control unit
replace the control unit. The controller will automatically load the program into the new control unit.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts.


E 12
High limit stat open
supply temperature too high
VERY RARE THAT AIR IS AT FAULT. If air is present it will be indicated by a gurgling noise. Normally when an airlock is
Caused by
- presence of air
-possible polluted impeller of the circulation boiler pump
- polluted internal filter
check de-aerator
Replace when necessary the automatic de-aerator and restart boiler for de-aerating programm (17min.)
check water flow over system
Clean the pump and/or filter when necessary.
Flush complete system
check adjustment of balancing valves

WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 13
control unit error
software error
control unit
Replace the control unit. Remove the E-Prom from the defective control unit and place onto the new control. The controller will automatically load the program into the new control unit.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

Temp °F	NTC 12K (12kΩ/77°F) supply sensor T1 return sensor T2 DHW sensor T3 outside sensor T4 flue gas sensor T5
-4	98,000
-0.4	90,000
3.2	82,000
6.8	74,000
10.4	66,000
14	58,000
17.6	53,500
21.2	49,000
24.8	45,000
28.4	40,500
32	36,000
35.6	33,500
39.2	30,900
42.8	28,200
46.4	25,600
50	23,000
53.6	21,400
57.2	19,900
60.8	18,100
64.4	16,600
68	15,000
71.6	14,000
75.2	12,900
78.8	11,900
82.4	10,850
86	9,800
89.6	9,100
93.2	8,500
96.8	7,900
100.4	7,200
104	6,500
113	5,600
122	4,600
131	4,000
140	3,400
158	2,300
176	1,700
194	1.300

Resistance table NTC-Sensors

E 14

- T3 flow sensor ground connection

T3 flow sensor failure or controller failure

To determine flow temperatures for T3 use the chart to the left for proper resistance values for a set temperature.

check the data in Error mode

boiler data during error

1 error
2 operational status
3 flow temp.
4 return temp.
5 kW burner
6 % pump

1 = 14
2 = 00
3 = -22
4 = xx*
5 = 00**
6 = xx*

* = variable values
**= x3415=BTU/hr

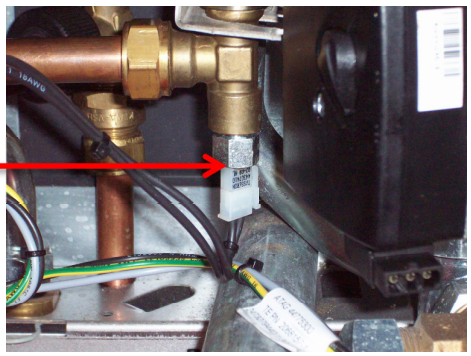
When no discrepancies are found on the sensors it may be a leakage of current coming in from an end switch or pump relay box connected to terms 22 and 23. Install isolating relay on 22 and 23 or replace faulty end switch / or pump relay box connected to

a temperature of - 36 is displayed at position 3

check the wiring and/or measure the resistance of the flow sensor. The resistance should be approx. 12 kOhm at 77°F.

if necessary, replace the flow sensor

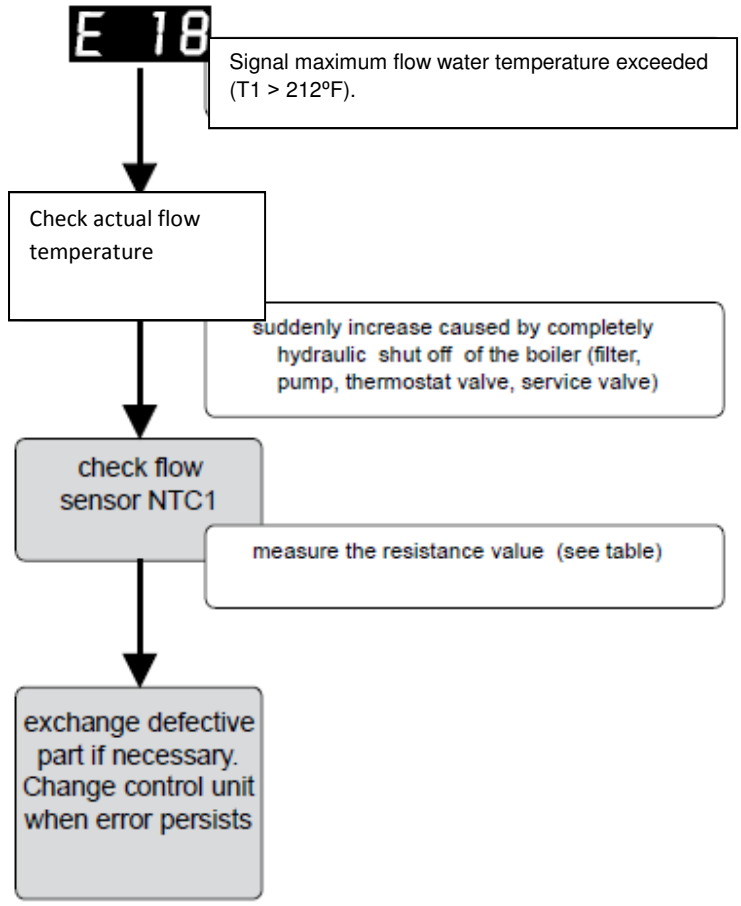
T3 Sensor is located behind the condensate trap on the E series boiler; this will look different on Q and QP boilers. This is a close up of the T3 sensor with the condensate trap removed.

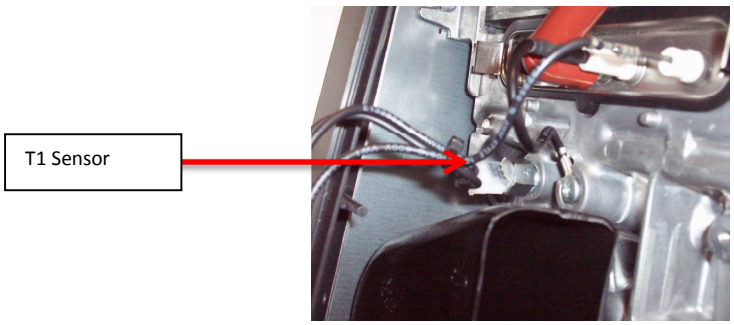


WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

Temp °F	NTC 12K (12kΩ/77°F) supply sensor T1 return sensor T2 DHW sensor T3 outside sensor T4 flue gas sensor T5
-4	98,000
-0.4	90,000
3.2	82,000
6.8	74,000
10.4	66,000
14	58,000
17.6	53,500
21.2	49,000
24.8	45,000
28.4	40,500
32	36,000
35.6	33,500
39.2	30,900
42.8	28,200
46.4	25,600
50	23,000
53.6	21,400
57.2	19,900
60.8	18,100
64.4	16,600
68	15,000
71.6	14,000
75.2	12,900
78.8	11,900
82.4	10,850
86	9,800
89.6	9,100
93.2	8,500
96.8	7,900
100.4	7,200
104	6,500
113	5,600
122	4,600
131	4,000
140	3,400
158	2,300
176	1,700
194	1.300

Resistance table NTC-Sensors


E 18
Signal maximum flow water temperature exceeded (T1 > 212ºF).
Check actual flow temperature
suddenly increase caused by completely hydraulic shut off of the boiler (filter, pump, thermostat valve, service valve)
check flow sensor NTC1
measure the resistance value (see table)
exchange defective part if necessary. Change control unit when error persists



WARNING: Turn off power and water supply to the boiler before removing or installing any parts

Temp °F	NTC 12K (12kΩ/77°F) supply sensor T1 return sensor T2 DHW sensor T3 outside sensor T4 flue gas sensor T5
-4	98,000
-0.4	90,000
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6.8	74,000
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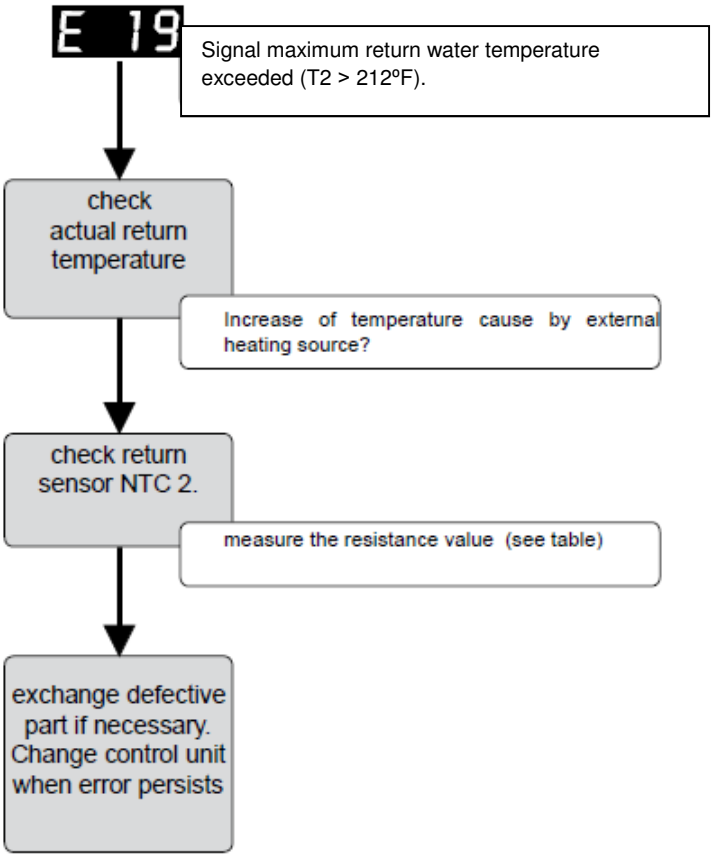
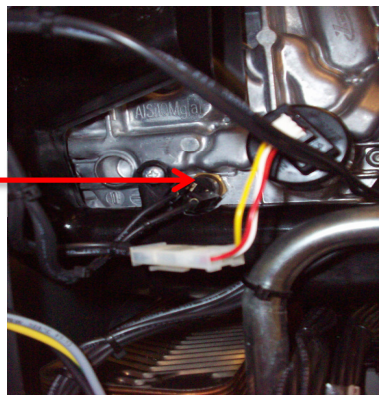
14	58,000
17.6	53,500
21.2	49,000
24.8	45,000
28.4	40,500
32	36,000
35.6	33,500
39.2	30,900
42.8	28,200
46.4	25,600
50	23,000
53.6	21,400
57.2	19,900
60.8	18,100
64.4	16,600
68	15,000
71.6	14,000
75.2	12,900
78.8	11,900
82.4	10,850
86	9,800
89.6	9,100
93.2	8,500
96.8	7,900
100.4	7,200
104	6,500
113	5,600
122	4,600
131	4,000
140	3,400
158	2,300
176	1,700
194	1,300

Resistance table NTC-Sensors


E 19
Signal maximum return water temperature exceeded (T2 > 212ºF).
check actual return temperature
Increase of temperature cause by external heating source?
check return sensor NTC 2.
measure the resistance value (see table)
exchange defective part if necessary. Change control unit when error persists

T2 Sensor located under T1 sensor



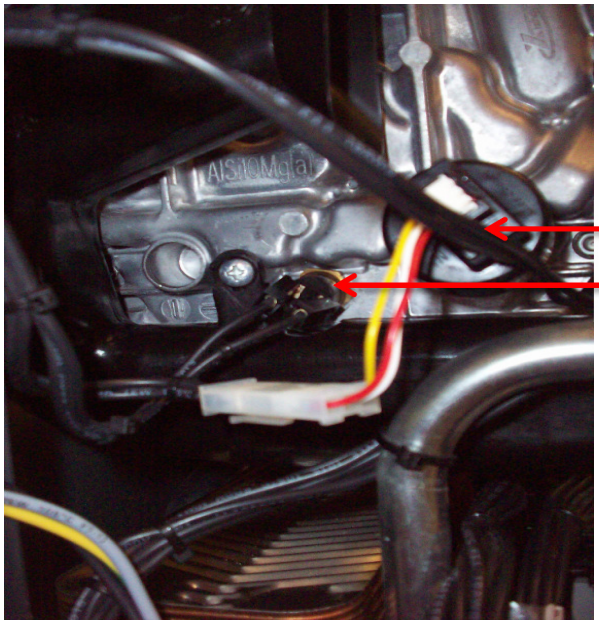
WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

E 24

T1 and T2 (swapped).

Failure on temperature

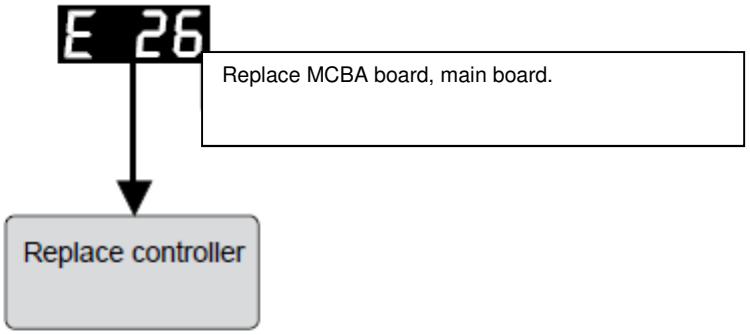
T2 temperature is measured to be higher than T1. Check resistance value of T1 and T2 (See resistance chart under error 19 for resistance values. Replace T! and/or T2 if found to be defective.



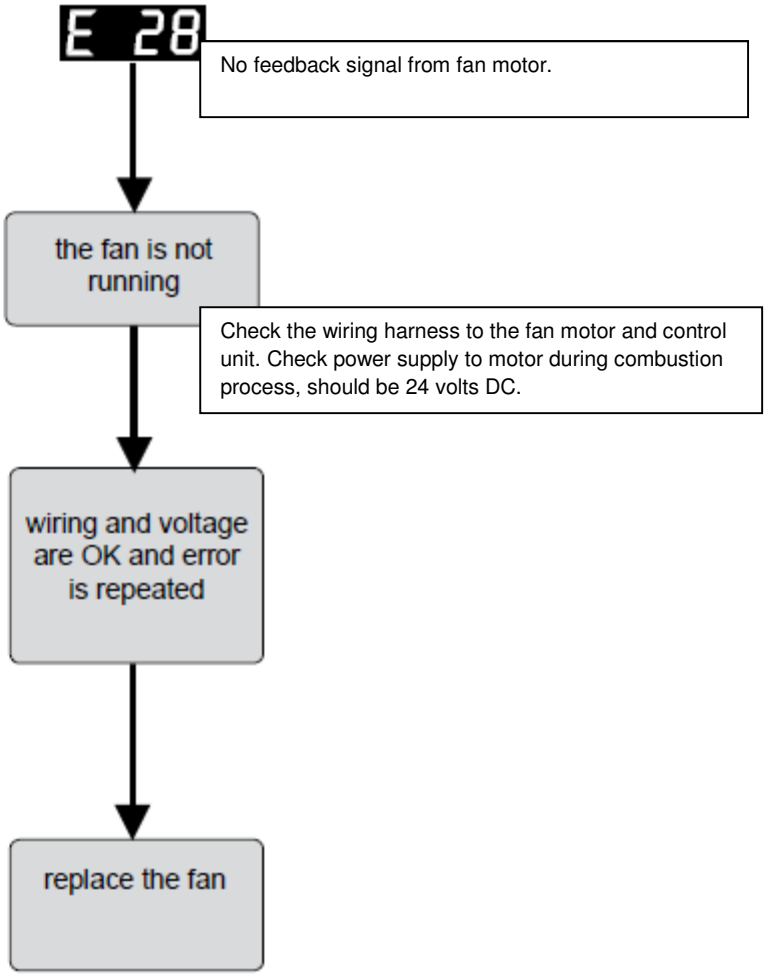
T1 Pressure Transducer

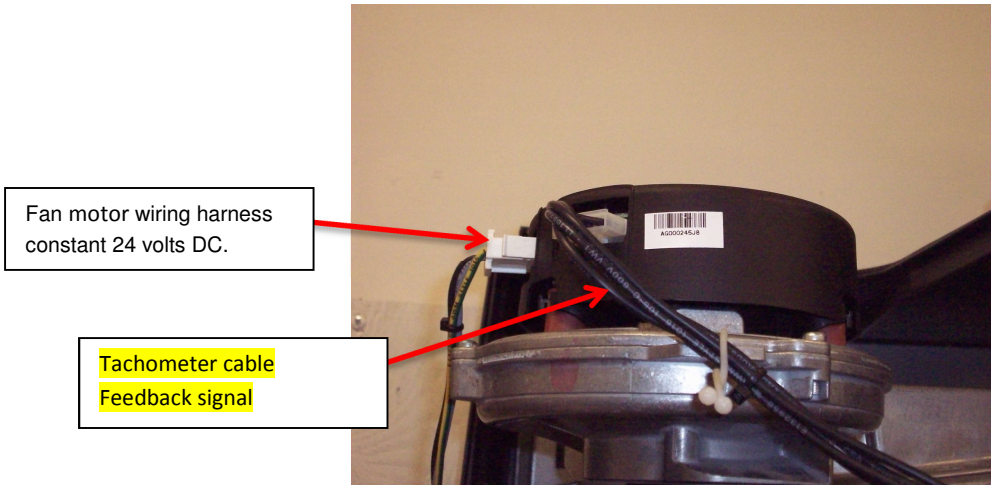
T2 sensor

WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.

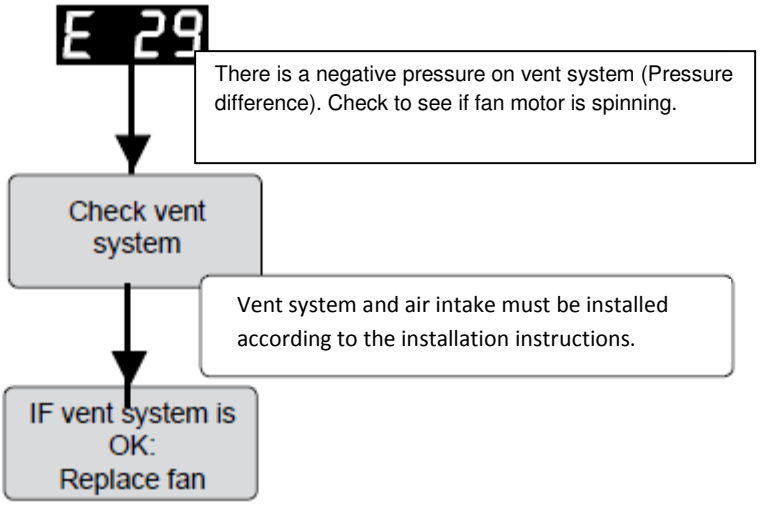


WARNING: Turn off power supply to the boiler before removing or installing any parts.


E 28
No feedback signal from fan motor.
the fan is not running
Check the wiring harness to the fan motor and control unit. Check power supply to motor during combustion process, should be 24 volts DC.
wiring and voltage are OK and error is repeated
replace the fan



WARNING: Turn off power to the boiler before removing or installing any parts


E 29
There is a negative pressure on vent system (Pressure difference). Check to see if fan motor is spinning.
Check vent system
Vent system and air intake must be installed according to the installation instructions.
IF vent system is OK:
Replace fan

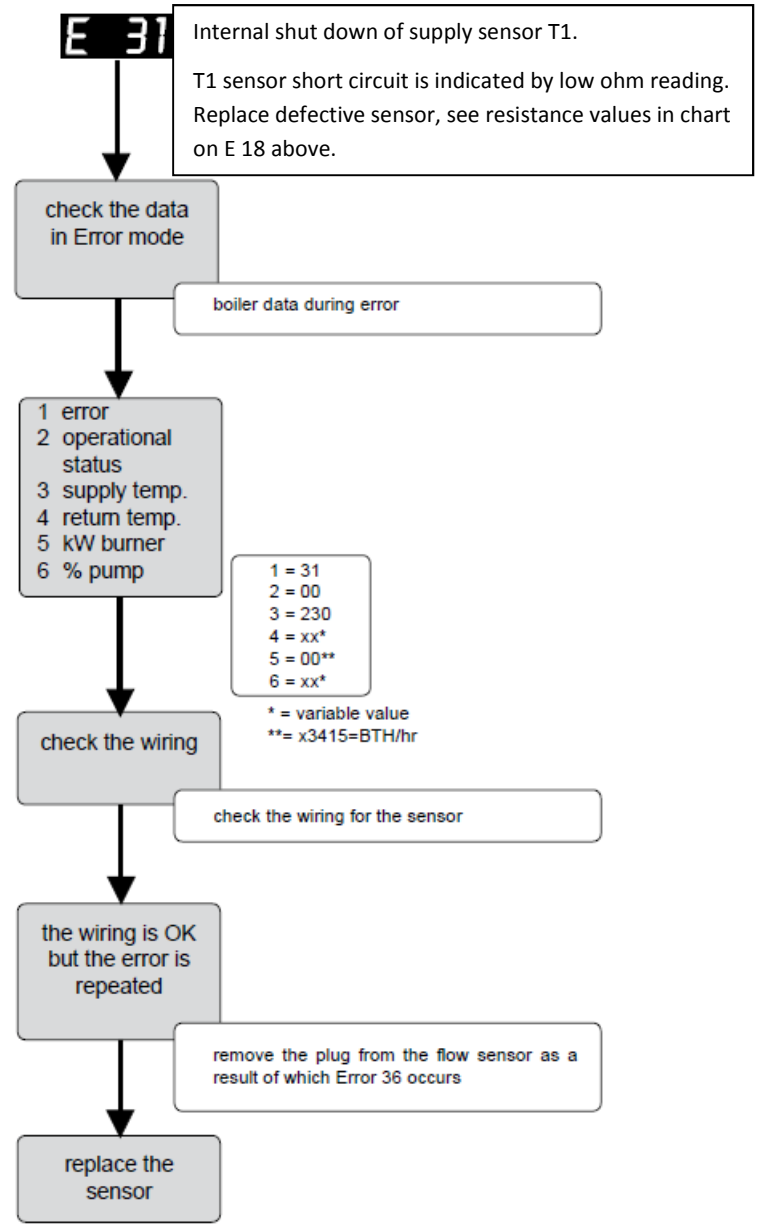
The E29 is triggered immediately after fan check code 5 during the starting sequence. If during fan check 5 the fan remains spinning more than 150 rpms an E29 will occur.

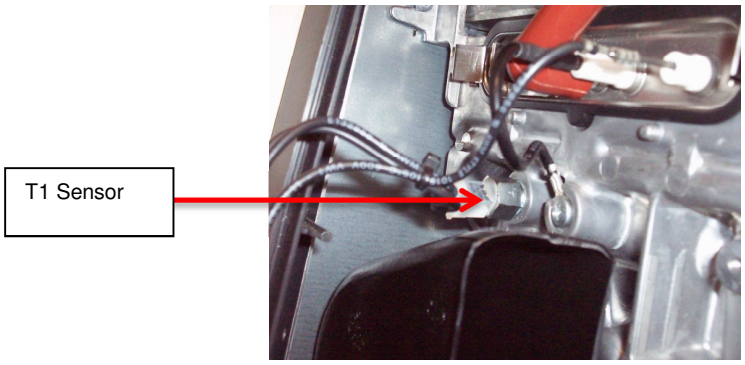
Causes:

- Wind driving into a concentric terminal. Replace with 90 degree terminal or for best results use a roof terminal.

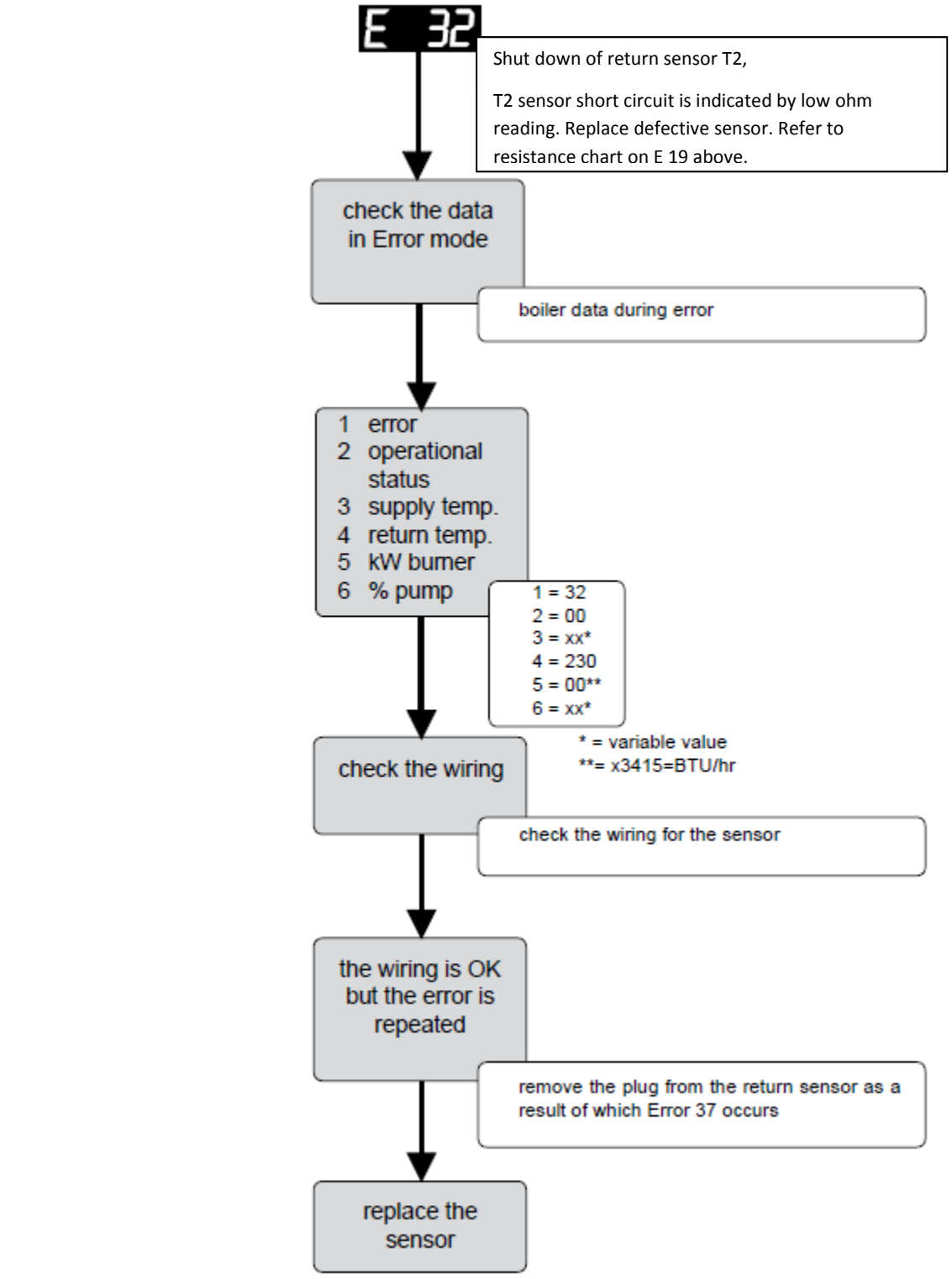
- Venting running a long distance in a cold attic space causing a thermo syphon after fan check. Use room air for combustion if conforming to NFPA 111 guidelines for room air or use concentric terminal directly through the roof.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

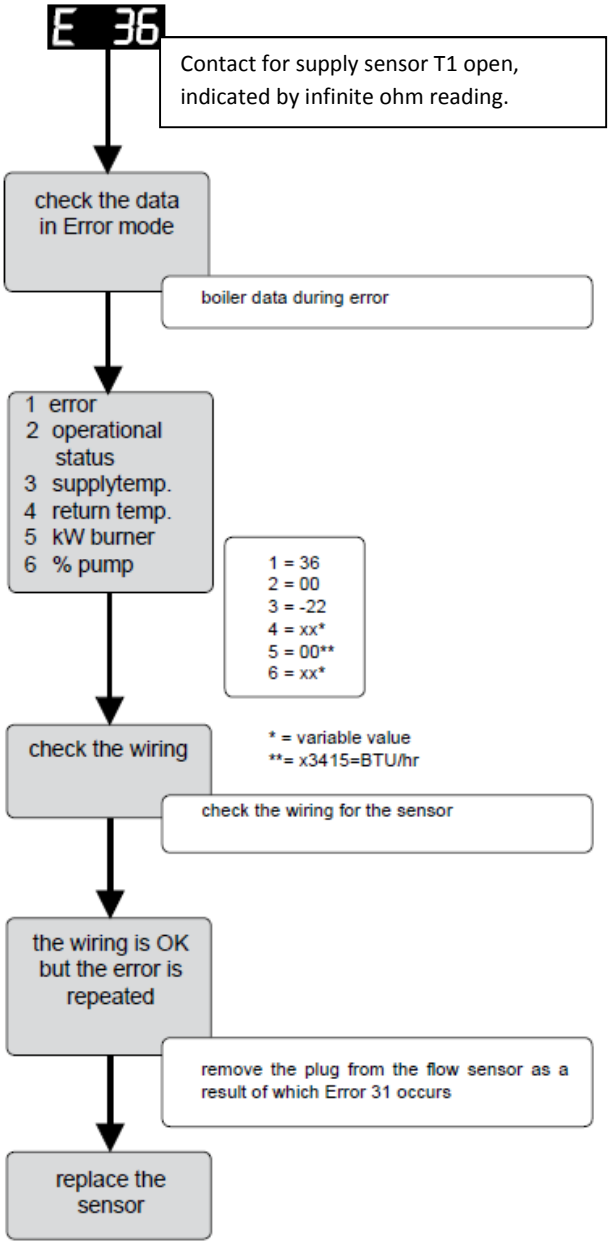

E 31
Internal shut down of supply sensor T1.
T1 sensor short circuit is indicated by low ohm reading. Replace defective sensor, see resistance values in chart on E 18 above.
check the data in Error mode
boiler data during error
1 error
2 operational status
3 supply temp.
4 return temp.
5 kW burner
6 % pump
1 = 31
2 = 00
3 = 230
4 = xx*
5 = 00**
6 = xx*
* = variable value
**= x3415=BTH/hr
check the wiring
check the wiring for the sensor
the wiring is OK but the error is repeated
remove the plug from the flow sensor as a result of which Error 36 occurs
replace the sensor

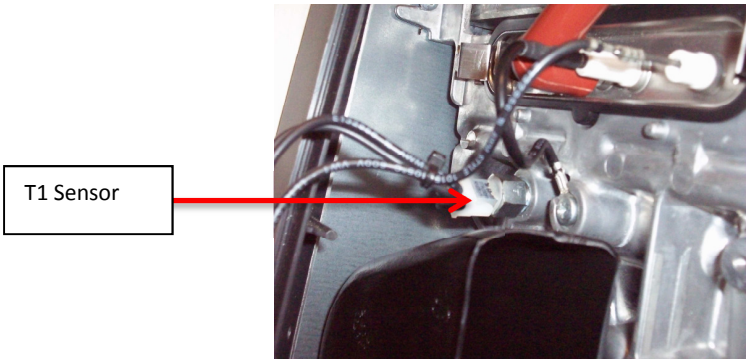


WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

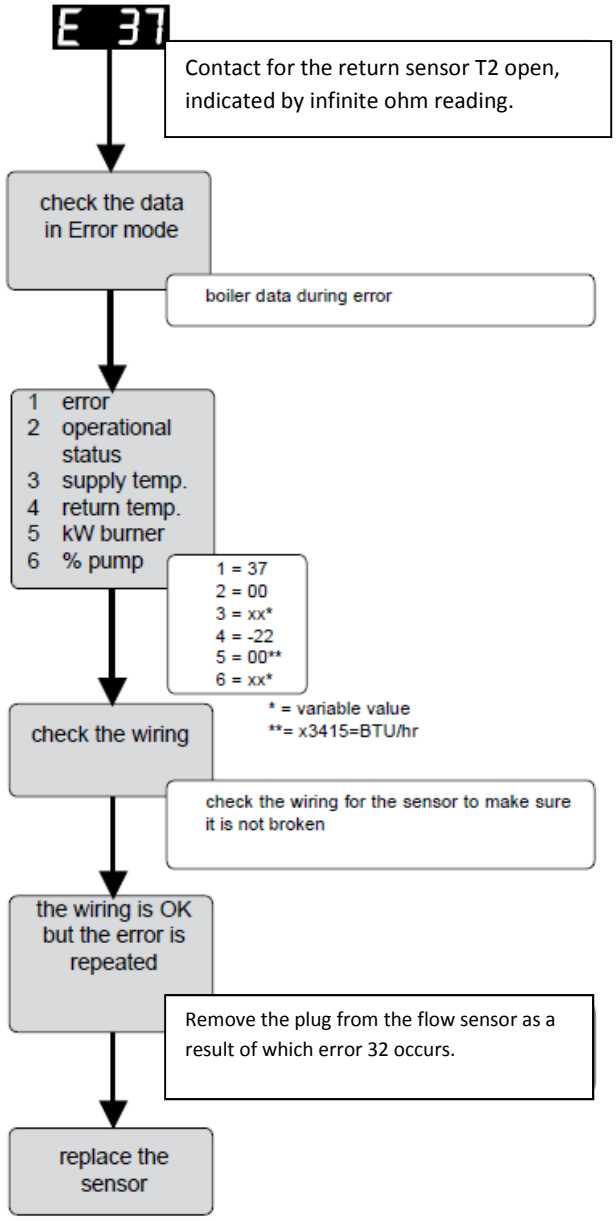

E 32
Shut down of return sensor T2,
T2 sensor short circuit is indicated by low ohm reading. Replace defective sensor. Refer to resistance chart on E 19 above.
check the data in Error mode
boiler data during error
1 error
2 operational status
3 supply temp.
4 return temp.
5 kW burner
6 % pump
1 = 32
2 = 00
3 = xx*
4 = 230
5 = 00**
6 = xx*
* = variable value
**= x3415=BTU/hr
check the wiring
check the wiring for the sensor
the wiring is OK but the error is repeated
remove the plug from the return sensor as a result of which Error 37 occurs
replace the sensor

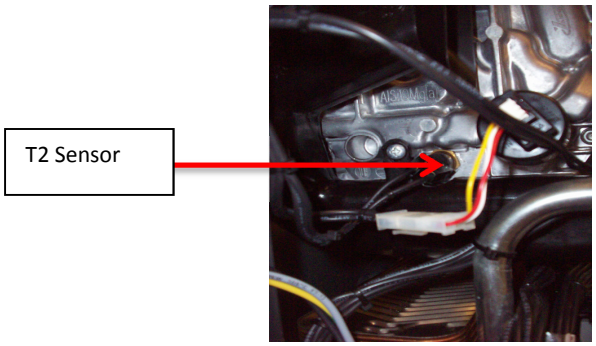
WARNING: Turn off power and water supply to the boiler before removing or installing any parts.


E 36
Contact for supply sensor T1 open, indicated by infinite ohm reading.
check the data in Error mode
boiler data during error
1 error
2 operational status
3 supplytemp.
4 return temp.
5 kW burner
6 % pump
1 = 36
2 = 00
3 = -22
4 = xx*
5 = 00**
6 = xx*
* = variable value
**= x3415=BTU/hr
check the wiring
check the wiring for the sensor
the wiring is OK but the error is repeated
remove the plug from the flow sensor as a result of which Error 31 occurs
replace the sensor

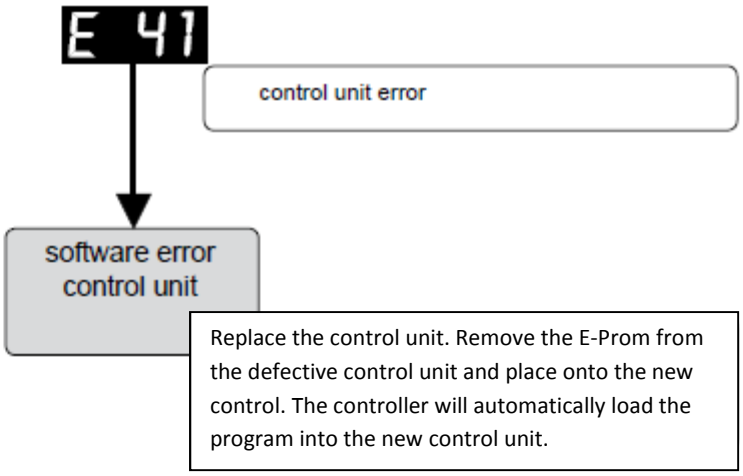


WARNING: Turn off power and water supply to the boiler before removing or installing any parts.

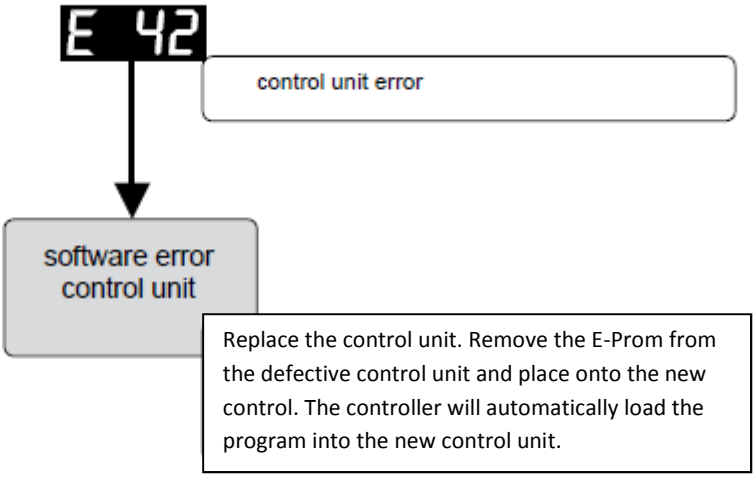

E 37
Contact for the return sensor T2 open, indicated by infinite ohm reading.
check the data in Error mode
boiler data during error
1 error
2 operational status
3 supply temp.
4 return temp.
5 kW burner
6 % pump
1 = 37
2 = 00
3 = xx*
4 = -22
5 = 00**
6 = xx*
* = variable value
**= x3415=BTU/hr
check the wiring
check the wiring for the sensor to make sure it is not broken
the wiring is OK but the error is repeated
Remove the plug from the flow sensor as a result of which error 32 occurs.
replace the sensor



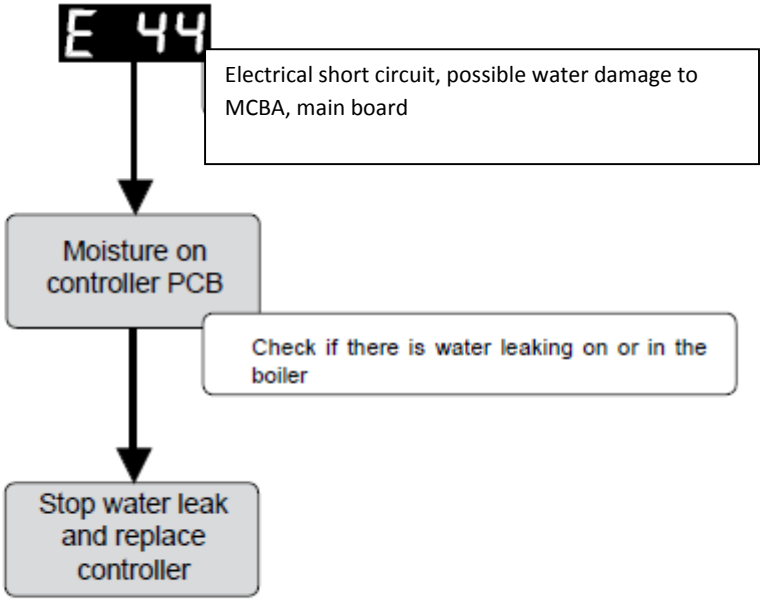
WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 41
control unit error
software error
control unit
Replace the control unit. Remove the E-Prom from the defective control unit and place onto the new control. The controller will automatically load the program into the new control unit.

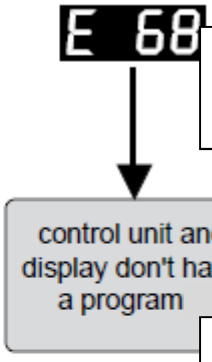
WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 42
control unit error
software error
control unit
Replace the control unit. Remove the E-Prom from the defective control unit and place onto the new control. The controller will automatically load the program into the new control unit.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.


E 44
Electrical short circuit, possible water damage to MCBA, main board
Moisture on controller PCB
Check if there is water leaking on or in the boiler
Stop water leak and replace controller

WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.



No parameters present. Meaning the E-Prom has no program or is blank. Replace E-Prom or display (Model dependent).

If this error is displayed, there is no software on the MCBA or display/EPROM. A RINNAI conversion kit specific for the boiler model and fuel type must be installed. Follow the conversion kit instructions to load the software to the MCBA.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.

No software present.

Replace the control unit. Remove the E-Prom from the defective control unit and place onto the new control. The controller will automatically load the program into the new control unit.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts

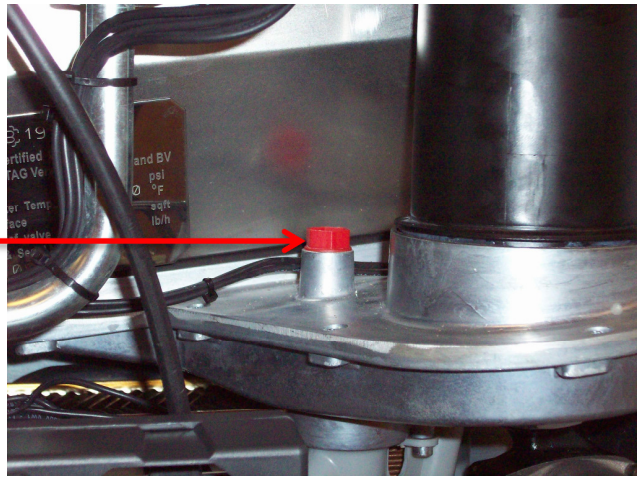
E 80

T5 sensor is reading too high of a flue gas temperature. (Adjust parameter 84 – default 212 ^{o}F) See location of T5 sensor below. If red cap is installed, T5 sensor is not being used.

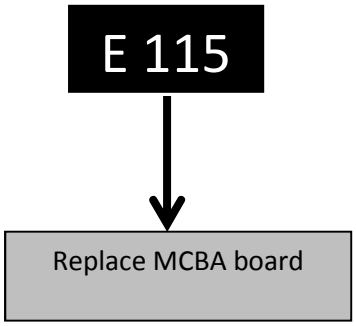
Replace flue sensor or adjust parameter 84 to default

Moisture on the flue gas sensor wires or terminals could cause a false temperature reading.

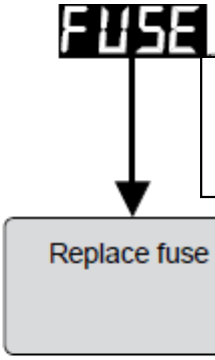
T5 Senor, if installed



WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.



WARNING: Turn off power to the boiler before removing or installing the fuse.



Check fuse mounted on PC board to see if it blown. In addition, check transformer output and wiring harness for transformer to ensure it is plugged in properly.

This is the low voltage fuse that is located directly next to the PCB board transformer. The OEM fuse has colored stripes; the spare fuse located on control cover is a clear glass. Please verify the amp rating (4 amp) on the metal rim of the fuse before installing it. It must be the same amperage as the fuse being replaced.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.

Additional Troubleshooting Instructions

Complaint	Description	Solution
Central heating but no domestic hot water	1. -Key of the DHW program is not switched on	Switch on DHW program on the Control Tower
	2. Flow switch is not working properly.	Check flow and/or check for impurities. Check on functioning. Replace if necessary.
	3. T3 DHW sensor in plate heat exchanger defective	Replace DHW sensor
	4. When using RS100	- Check timer times for DHW program, if necessary reset - RS100 does not respond to DHW program - See RS100 installation instructions
	5. Three-port valve is not circulating to DHW	- Check wiring. - If necessary replace the three-port valve motor.
Hot water but no central heating	1. -Key of the central heating program is not switched on.	Switch on central heating program
	2. Room thermostat (on/off) is not giving any signal to the boiler.	Check room thermostat
	3. RS100 with outdoor sensor (Room sensor-On)	- Outdoor temperature is higher than 70°F, depending upon the Eco-temperature set (70°F is the default). Check Info chapter Step 7 or temperature is higher than the Eco temperature set (see RS100 installation instructions). - Check timer program and set room temperature.
	4. Three-port valve is not circulating to central heating position.	Check wiring, replace the three-port valve motor.
Central heating installation gets hot without being requested	1. -Key pump program is on.	Switch off.
	2. Dirt in three-port valve or three-port valve cartridge is binding.	Clean or replace.

WARNING: Turn off power and water supply to the boiler before removing or installing any parts. If checking gas pressures you MUST be qualified gas technician to service the gas system on this appliance.

Insufficient quantity of hot water	1. Hot and cold water connection to the boiler mixed up.	Check left = hot, right = cold
	2. Incorrect flow reducing valve.	- Check for the type and for contamination, if necessary replace (Combi) and/or clean. - Check the comfort synchronising valve for the correct setting in accordance with the installation instructions.
	3. In the absence of positive results	Lime scale in plate heat exchanger. If necessary descale or replace

Temperature drop of the DHW (Combi)	1. Hot and cold water connection to the boiler mixed up	Check left = hot, right = cold
	2. Flow reducing valve.	Check flow reducing valve for the correct type in accordance with the installation instructions
	3. DHW power for the boiler is set too low.	- Check PARA chapter Step No. 43 - Check the functioning and wiring of the DHW sensor T3.

radiators do not get hot enough or warming them up takes too long	1. Check setting of room thermostat or RS100	See installation and user manual RS100
	2. Supply water temperature too low.	Check setting PARA chapter Step No. 1 and increase if necessary
	3. Incorrect choice of installation	PARA chapter Step No. 2 if necessary change.
	4. Installation resistance too high (given an average T > 36°F the boiler decreases the load).	- See installation instructions. - Check / clean water filter check dimensions of pipes.

Checking the O_2 Setting

NOTICE

The O_2 percentage setting is required to be checked at commissioning, maintenance and faults and adjusted if needed.

WARNING

The O_2 percentage is required to be checked and adjusted after a conversion from NG to LP or from LP to NG. This process must be done with a calibrated combustion analyzer that has been set to the correct gas type.

This can be checked by means of the following procedure:

- Remove the black cover of the gas valve by unscrewing the sealed screw.
- Put the boiler into operation and take care that it can deliver its heat;

Tip: If there is no demand for heat on CH, turn the hot water tap completely open and measure the O_2.

- Press the MODE-button for 5 seconds.
- The display will show COdE followed by an arbitrary number;
- Select by means of the (-) or the (+) button the code C123;
- Press the Store-button to confirm the code (code blinks 1 x);
- Press the MODE-button until SERV is shown;
- Press the STEP-button once until 1 is shown; alternately 1 and OFF will be shown.
- Calibrate the O_2 meter ;

checkpoint O_2

figure 27

- Place the probe of the O_2 meter into the check point (see fig. 27);
- Press the (-) button until the maximum value (in kW) is achieved;
  The boiler will burn on full load (value on display in kW)
  value in BTU/hr = x3415

NOTICE

When adjusting from max. to min. load it is advisable to stop at medium load to allow the boiler to stabilize. Adjusting quickly from max. to min. could force the boiler into an error state.

adjustment screw O_2 fig. 28

- Check the O_2 percentage:

Natural Gas:	full load:	between 4.4% and 4.7%
	min. load:	setting of full load +0.2% or greater
Propane:	full load:	between 4.8% and 5.1%
	min. load:	setting of full load +0.2% or greater

Example:Full load set on 4.6% O_2 (natural gas) then the minimum load setting should be 4.6% or greater.

NOTICE

Choose the right O_2 value according the kind of gas (Natural Gas or Propane Gas). Wrong adjustment may result causing property damage, personal injury or death.

- Let the O_2 meter do its measuring procedure.
- Adjust, if necessary, the adjustment screw to correct the O_2 value (see fig. 28). Allow boiler to stabilize before reading the new value.

The boiler is provided with a fully automatic microprocessor control, called CMS Control Management System. This control simplifies operation by undertaking all major control functions. Initially when power to the unit is switched on it will remain on standby. There is no indication LED on, until one of the program buttons is pressed. The control panel display will show the relevant state. When the installation is empty the display will show FILL.
The various parameters can be called up in two ways:

The Good-state or standard read out

The first way shows a simple display read out.
The boiler in operation will always show 'Good'. When a message is necessary this will be shown instead of Good.

Technical read out

The second way is a technical read out. In normal situations the following will be shown:

Example

- on the left the status in which the boiler is active;
- on the right the supply temperature in °F;

Alternately indicated by:

Example

- the water pressure in the installation in PSI.

When a message (error or blocking code) is necessary this will be shown instead of the technical read out.

NOTICE

To switch over from the Good-state to the Technical read out (and vice versa):
- Press the STEP-button for 5 seconds.

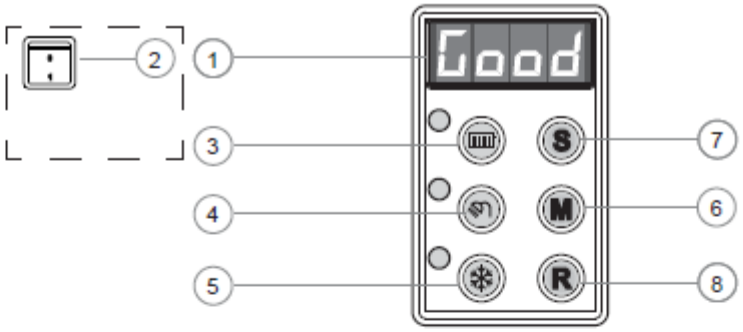
When the system has been filled the automatic de-aeration program starts, when a program has been selected, by pressing the button for Central Heating, DHW or pump program (of). The program takes 17 minutes and stops automatically. After this the unit will function normally. (See also 'Filling and de-aerate the boiler and installation, chapter 9).

On a call for heating or hot water the control system will select the required water control temperature. This water temperature is called the T-set value. On a call for central heating the boiler ignites first at low input. The input is then changed slowly to match the load required. The boiler operates in this way to avoid excessive water noises and temperature overshoot. On a call for domestic hot water supply the T-set value of central heating return water temperature is monitored. Depending on the amount of domestic water which is withdrawn from the DHW fascility, the central heating return water temperature, from which the input is adjusted, will vary.

Operation indication
(in the first display position by technical read out)

0	No heat demand
1	Fan pre/post purge
2	Ignition phase
3	Burner active on central heating
4	Burner off while there is a demand for central heat of DHW
5	Fan check
6	Burner off when room thermostat is demanding or burner off when DHW is calling
7	Pump overrun phase for central heating
8	Pump overrun phase for hot water
9	Burner off because of to high flow temperature
A	Automatic de-aeration program

Explanation of the function buttons



Boiler control panel figure 24

NOTICE

Only qualified personnel who are trained for servicing these boilers are permitted to make alterations in the controller to calibrate the boiler to the installation.

1. **Display**. See previous page for further information.
2. **ON-OFF Switch (Placed separately next to the boiler)**
   This switch turns the power supply to the boiler on or off.

CAUTION

Only turn the boiler off using this switch, when the burner is off..

3. **Central Heating program button.**
   Switching the Central Heating on or off (LED on/off);
4. **Hot Water program button.**
   Switching the Domestig Hot Water (DHW) facility on or off (LED on/off);
5. **Pump program button.** This LED should never be left on.
   adjusts the pump to continuous water circulation in the central heating system (LED on), or according to the pump overrun times on the relevant programs (LED off);

NOTICE

When the pump is switched on continuously it can lead to undesired heating up of the central heating system during the summer.

6 **Mode-button.**
After briefly pressing, a selection of the data chapters can be retrieved.
After pressing for 5 seconds it is possible to enter the code as described in chapter 11.3;

7 **Step-button.**
After briefly pressing, the water pressure can be retrieved and pages per chapter can be retrieved.
After pressing for 5 seconds it switches from the Good-state to technical read out and vice versa;

8 **Reset-button.**
After briefly pressing, for:
- unlocking errors;
- ending the access code:

Pressing R or the reset button for more than 5 seconds will activate a 17 minute de-aeration cycle.

Some buttons have other functions.These functions are only active when according to the procedure described in chapter 10, adjustment has to be changed or data must be retreived from the CMS. The other functions are:

3.	Central Heating program button :	+ function;
4.	Hot Water program button:	- function;
5.	Pump program button :	store-function, which means that by means of this button a modified setting is confirmed;
7.	Step-button:	scrolling in a data chapter.

Starting up: Filling and de-aerating the boiler and installation

CAUTION

CAUTION
Observe the following rules of safety:
- All work on the unit must take place in a dry environment.
- Rinnai units may never be in operation without their housing, except in connection with maintenance or adjustments (see Chapter 12 and 13).
- Never allow electrical or electronic components to come into contact with water.

NOTICE

NOTICE
Carry out the following tasks in connection with maintenance, etc. to an already-installed unit:
- Shut down all programs
- Close the gas shut off valve
- Shut off the power at the main power switch
- Close the service valves (system supply and return)

NOTICE

NOTICE
Take note of the following when maintenance or adjustments are needed:
- The unit must be able to function during these activities; for this reason, the unit's supply voltage, gas pressure and water pressure must be maintained. Ensure that this is not a source of potential danger during these activities.

WARNING

Following maintenance or other activities; always check the installation of all parts through which gas flows (with bubble test using leak-search spray).

Requirements of the water system

Before filling the heating system, the complete system, including all zones, must be thoroughly cleaned and flushed to remove sediment. Flush until clean water runs free of sediment. Rinnai suggests using an approved system cleaner to flush the system, but not the boiler. Always use Rinnai approved antifreezes. See the list at the end of this chapter. Never use reverse osmosis, D.I., or distilled water for filling the heating system.

WARNING

Do not use petroleum-based cleaning or sealing compounds in the boiler system. Damage of seals and gaskets in boiler and system could occur, resulting in substantial property damage.

The central heating installation needs to be filled with potable water.

WARNING

Use only potable water or approved glycol for filling the heating system. When the water hardness of the filling water exceeds > 10.5 gpg (200 mg/L) and the volume of the installation > 20L/kW (5.2 gallons/3,412 BTU) the water has to be treated until below the maximum value of 10.5 gpg (200 mg/L). The pH value of the installation water must be between 6.5 and 8.5.

Check the pH value using proper equipment or by having the water analyzed by a water treatment company.
If pH differs from above, contact Rinnai engineering for further assistance.

NOTICE

Failure to adhere to the water quality requirements will void the warranty.

Freeze protection

Freeze protection for new or existing systems must use glycol that is specially formulated for this purpose. This includes inhibitors, which prevent the glycol from attack the metallic components. This should be for multi-metallic components.
Make certain to check that the system fluid is correct for the glycol concentration and inhibitor level. The system should be tested at least once a year and as recommended by the producer of the glycol solution. The allowed maximum concentration is 50%.

NOTICE **Use only Rinnai approved inhibitors. See below for an approved list of inhibitors.**

WARNING **Use only inhibited propylene glycol solutions, which are specially formulated for central heating systems. Ethylene glycol is toxic and can attack gaskets and seals used in the boiler and system. Approved glycols are listed below.**

NOTICE **Additives in the installation water are not permitted.**

Approved antifreeze: (max. concentration 50%)	• Rhomar RhoGard Mutli-Metal (AL safe) • Noble Noburst AL	• Sentinel X500 • Fernox Alphi 11
Approved system cleaner:	• Noble Noburst Hydronic System Cleaner • Rhomar Hydro-Solv 9100	• Fernox F3 Cleaner • Sentinel X400

NOTICE **The system cleaners from NoBurst, Rhomar, and Fernox are not to be used in the boiler. The boiler must be closed off (valved off) from the rest of the system or not connected while the cleaners are in the system. The system should then be drained and then thoroughly flushed with clean water to remove all the system cleaner.**

Approved inhibitors:	• Rhomar Pro-tek 922 • Noble Noburst AL inhibitor	• Sentinel X100

Filling the heating system

For filling or topping off the installation you use the filling loop according to the following procedure:

1 Switch on the power supply;

FILL 2 The display will show FILL;

3 All functions off (heating, DHW and pump);

4 Push briefly the 'STEP'-button: P XX (XX = water pressure in PSI);

5 Open the filling loop (Indication on display increases);

P 22 6 Fill up slowly to 16 to 18 PSI (1.1 and 1.3 bar);

StoP 7 STOP appears on the display;

8 Close the filling loop;

9 De-aerate the complete installation, start at the lowest point;

10 Check the water pressure and if necessary top it up;

11 Close the filling loop;

12 Activate the functions in use (heating, DHW and/or pump);

Note: You must have either a hot water or heat demand to activate de-aeration

A XX 13 If A XX appears on the display, wait for 17 minutes;

14 Check the water pressure and if necessary top it up to 16 to 18 PSI (1.1 and 1.3 bar)

15 Close the filling loop;

16 Press the 'STEP'-button;

17 Be sure that the filling loop is closed.

A XX
Good 0 XX 18 After the automatic de-aeration program (A XX) is finished the boiler will return to the Good state or Technical read out.

Check the water pressure regularly and top off the installation when necessary. The working pressure of the installation should be between 16 and 18 PSI when the system is cold. Adjust your auto-feed to 16 – 18 PSI.

NOTICE

It can take a while before all air has disappeared from a filled installation. Especially in the first week noises may be heard which indicate the presence of air. The automatic air vent in the boiler will remove this air, which means the water pressure can reduce during this period and therefore topping off with water will have to be done.

During normal use the following messages can occur with the necessary follow up:

FILL

Water pressure is too low (<10 PSI / 0.7 bar), FILL indication remains continuously visible, the boiler is taken out of operation. The installation needs to be topped off.

\ | / /
FILL
/ | | \

Water pressure is too low (<12 PSI / 0.8 bar), flashing FILL will alternate with indication of water pressure, boiler power of 50% is possible. The installation needs to be topped off.

HIGH

Water pressure is too high (>42 PSI / 3 bar), if HIGH indication remains continuously visible, the boiler is taken out of operation. The installation pressure needs to be decreased by draining water.

Altering adjustments

STEP 1 **Press the Mode-button for 5 seconds.**
The display shows COdE followed by an arbitrary number;

STEP 2 **Press by means of the + or the - button until the code C123 is shown;**

STEP 3 **Press the STORE-button to confirm the code (code blinks1 x).**

Now you have acces to the installer level. There are 4 chapters:
- PARA *Parameters*
- INFO *Information chapter (no adjustments possible)*
- SERV *Service chapter*
- ERRO *Error-chapter (no adjustments possible)*

The content of the chapters is described on the following pages.

STEP 4 **Press briefly the MODE-button to select one of the 4 chapters, i.e. PARA;**

STEP 5 **Press briefly and release the STEP-button to select a Parameter**
(parameter visible on the left, value on the right) ;

STEP 6 **Alter the value, if necessary/possible, by means of the + or the - button**

STEP 7 **Press briefly on the STORE-button to confirm the alteration.**
When you have to change more values, repeat from step 5.

STEP 8 **Press once or more on the MODE-button until StBY or Good is shown:**
After a few seconds the text StBY will be replaced by the technical read-out or Good-state (Depending from the position the acces code is entered)
When you want to return from an arbitrary position to the original read out press once or more on the MODE-button until StBY is shown.

NOTICE If no single button is used within 20 minutes the display will return automatically to its original read-out (Good state or technical read out)

Parameter Mode

PARA	FACTORY	DESCRIPTION	RANGE
1	176°F	maximum supply temperature CH	68 - 176°F
2*	00	type of CH installation:	00 - 04
		No pre-selection made. Radiators, air heating, or convectors: T max. supply 176°F K factor heating curve 2.3; gradient 10°F/min; gear differential 10°F	00
			01 DO NOT USE
		radiators with large surface areas or underfloor heating as additional heating: T max. supply 158°F K factor heating curve 1.8; gradient 10°F/min; gear differential 10°F	02
		under floor heating with radiators as additional heating: T max. supply 140°F; K factor heating curve 1.5; gradient 8°F/min; gear differential 8°F	03
		full under floor heating: T max. supply 122°F; K factor heating curve 1.0; gradient 6°F/min; gear differential 6°F	04
3	max.	maximum power CH in kW (.. x3415 = .. BTU/hr)	min-max
4*	00	control principal with on / off thermostat: 100 % on / off thermostat constant water circulation 22&23 closed contact day curve operation, open contact night curve operation	 00 01
5*	2.3	heating curve K-factor (see also heating curve graph)	0.2 - 3.5
6*	1.4	heating curve exponent (see also heating curve graph)	1.1 - 1.4
7*	14°F	heating curve climate zone (see also heating curve graph)	-4 - 32°F
10*	0°F	fine adjustment heating curve day temperature	-8 to 10°F
11*	0°F	fine adjustment heating curve night temperature	-8 to 10°F
14	10°F/min.	gradient speed °F/min.	0 - 28°F/min.
15*	00	Booster after night decrease*: no yes	 00 01
23	26°F	Frost Temperature	-4 to 50°F
27	32°F	Minimum T-set CH	0 - 158°F
36	10	Type of three way valve and DHW fascility VC 2010 / VC 8010 Warming function plate heat exchanger ON Warming function plate heat exchanger OFF	 x0 1x 2x
43	max.	Maximum power DHW in kW (.. x3415 = .. BTU/hr)	min-max
49	100%	Maximum pump capacity heating	100 %
73	0	Altitude and venting CFT. See chapter 6.7.7	0 - 100
89	00	Address No function Bus thermostat	 -01 00
90	01	Display reading °C and Bar °F and PSI	 00 01

See additional definitions below

PARA 36 E Combi. setting definitions
00 = activation by temperature drop for DHW (no plate warming)
10 = activation by temperature drop for DHW (plus plate warming)
20 = flow switch activation only DHW. (No plate warming/ no temp actuation)

In either setting above - 00 or 10 the Flow switch is still in the circuit and if it sticks "closed" it can keep the boiler locked in DHW and code 6 with appear on the screen. Unplug flow switch as it is not needed. (Do not waste time taking switch out and cleaning it, just unplug it electrically)

PARA 36 Q combi
01 = factory setting-load sharing "on"
00 = Alternate setting - Load sharing "off" (MCBA thinks a "grey" non-modulating valve is being used in place of the "Black" modulating valve) All other combinations are NOT to be used on Q-combi boilers)

Info Mode			
INFO	FACTORY	DESCRIPTION	RANGE
1	°F	supply water temperature T1	
4	°F	return water temperature T2	
5	°F	DHW temperature T3	
7	°F	outdoor temperature T4	
8	°F	flue gas temperature T5 (optional sensor)	
16	%	actual power in %	
17	kW	actual power in kW (.. x3415 = .. BTU/hr)	
18	kW	actual load in kW (.. x3415 = .. BTU/hr)	
20		indication bus communication	
21	GJ	consumption total in GJ (.. x 33 = .. m3)	
22	GJ	consumption CH in GJ (.. x 33 = .. m3)	
23	GJ	consumption DHW in GJ (.. x 33 = .. m3)	
24	h	total number of burner run hours	
25	h	number of burner run hours CH	
26	h	number of burner run hours DHW	
32	h	total number of hours counter	
37	h	total number of run hours pump CH and DHW	
46	h	within how many hours is service required	

Service Mode			
SERV	VALUE	DESCRIPTION	RANGE
1	OFF	boiler in operation with burner function on	OFF - max.
2	OFF	fan adjustable and burner off	OFF - max.
3	OFF	pump adjustable with burner on	OFF - max.
4	OFF	showroom position ON = active and OFF = non active	ON - OFF

Error Mode		
ERRO	VALUE	DESCRIPTION
Err.L - Err.5		Last saved error until 5 last previous errors
1		error code
2		operation status boiler
3	°F	supply water temperature T1
4	°F	return water temperature T2
5	kW	load (.. x3415 = .. BTU/hr)
6	%	pump capacity

Parameter-, Info-, Service- and Error-chapters

Activating factory settings (Green button function)

To activate the factory settings again please follow the next procedure (Note: all altere adjustments will be set back to their orignial factory settings that are accessible in th current service level the boiler is in either user or 123):

- Select, when necessary, the technical read out;
- Select with the MODE-button chapter PARA;
- Press the STORE-button.

The word "Copy" will appear and the factory settings are active again.

Isolating the boiler

Some situations require turning the entire boiler off.
By switching off the three buttons with the LED's for central heating, hot water and pump program (, or), the boiler is switched off. Do not shut off the power of the boiler, which means the circulation pump and the three-way valve are activated once every 24 hours in order to prevent these parts from seizing up.

CAUTION

In the event of frost danger during an isolated boiler it is advisable to drain the boiler and/or the installation.

Reset service interval counter

At 4000 hours of use, “SERVICE” will scroll across the display. “Good” will display as well alternatively.

To reset the 4000 hour service notification:

- Enter the 1st Tier Settings: 123 Code

- Briefly press “Mode” again until the Service Chapter is displayed (SERV)

- Hold the “Store” button until SERV flashes once—the service notification will no longer show during normal operation and the countdown to service will reset to 4000.